

Customer Service Program (CSP)

Service Market Analysis

Large and Small Systems

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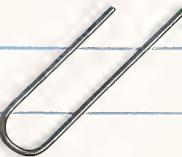
DECEMBER 1987

SERVICE MARKET ANALYSIS

LARGE AND SMALL SYSTEMS

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***Service Market Analysis
Large and Small Systems***

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Abstract

Customer services growth expectations have declined as a result of increased user pressure to decrease service prices, as well as increased competition from other manufacturers and third-party maintenance organizations.

This report, *Service Market Analysis—Large and Small Systems*, provides an in-depth look at large and small systems manufacturers' market for customer services. The report begins by providing both current service market size and five-year forecasts for all customer services by product type. Next, the report sizes third-party maintenance (TPM) penetration into the total service market during the forecast period. The report then focuses in on the large and small systems marketplaces, examining current market size and expected growth rates for both manufacturer-based and TPM service.

The report continues by discussing key service developments that occurred during 1987 and how these developments affected the pricing, delivery, and profitability of service. Key issues discussed include increasing user requirements for system availability, service price trends, network service growth, and the growing competition between manufacturer service organizations and their third-party maintenance counterparts. Specific issues discussed include IBM's CSA (and similar) agreements, parts distribution, contract coverages, and T&M service availability.

The report contains 49 pages, including 20 exhibits.



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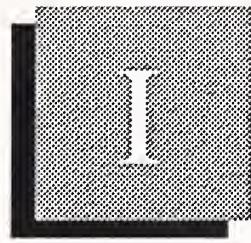
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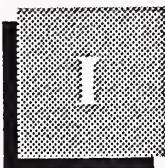
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Introduction

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Introduction

Customer service organizations are faced with increasingly contradictory pressures from both users and their own parent organizations in the pursuit of providing effective and profitable service. Users want better service performance while at the same time demand lower prices. The service organization is also expected to continue to be price-competitive while continuing to be profitable.

This report, *Service Market Analysis—Large and Small Systems*, provides an in-depth look at large and small systems manufacturers' market for customer services. The report begins by providing both current service market size and five-year forecasts for all customer services by product type. Next, the report sizes third-party maintenance (TPM) penetration into the total service market during the forecast period. The report then focuses in on the large and small systems, examining current market size and expected growth rates for both manufacturer-based and TPM service.

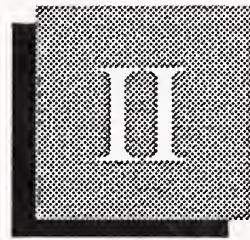
The report continues by discussing key service developments that occurred during 1987 and how these developments affected the pricing, delivery, and profitability of service. Key issues discussed include increasing user requirements for system availability, service price trends, network service growth, and the growing competition between manufacturer service organizations and their third-party maintenance counterparts. Specific issues discussed include IBM's CSA (and similar) agreements, parts distribution, contract coverages, and T&M service availability.

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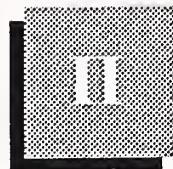
Methodology

This report was prepared as the culmination of INPUT's 1987 Customer Service Program research activities. Information gathered in the preparation of this report came from vendor and industry files that INPUT maintains in their corporate library at their headquarter location. Where appropriate, primary research findings were used and cited within the body of the report.

A list of definitions of terms used in this study has been included in Appendix A at the end of this report.



Executive Overview



Executive Overview

This summary is provided as a convenient overview of the main points of this report. It is presented in a format that facilitates the use of this section as a short presentation, with each exhibit accompanied by text that acts as a script detailing the key findings of the study.

In 1987, service organizations were faced with increased pressure from users to lower costs yet improve service performance. With user interest in third-party maintenance at a new high, system manufacturers, most notably IBM, fought back with new service offerings that lowered hardware maintenance prices, often to levels that squeezed service margins, since service costs could not drop as fast as service prices. IBM attempted to slow this profit "squeeze" by attaching increased user involvement in service to their discount offerings (the Corporate Service and Mid-Range Systems Amendments).

A

Service Growth by Product Market

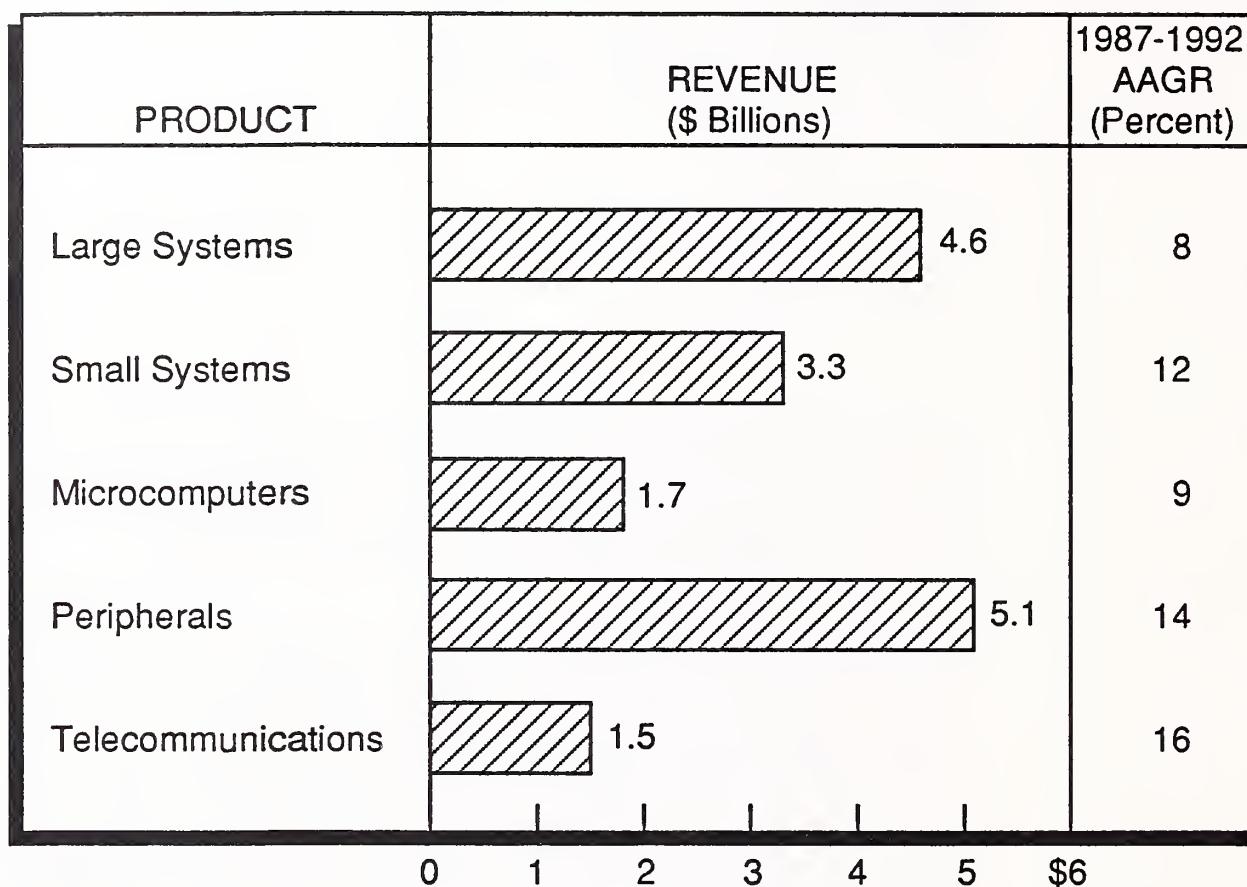
In 1986, the peripherals product service market passed large systems service as the largest product service market. This was caused by a number of economic factors that encouraged users to put off large new systems acquisitions and instead upgrade their existing systems with additional storage. This increased the demand for peripheral products and service. At the same time, vendor concern over slumping sales caused reduced purchase and service prices. This further impacted large systems user service expenditures.

Exhibit II-1 shows that large systems service has yet to recover, even though there has been some recovery in product shipments. Large systems service was impacted by continued service discounts offered by manufacturers. The most significant of these was IBM's Corporate Service Amendment (CSA).

Small systems service growth has been buoyed by continued sales of superminicomputer systems, most notably from Digital Equipment

EXHIBIT II-1

1987 SERVICE REVENUE BY PRODUCT MARKET



Corporation (the VAX 8XXX line) and the newly released 9370 line from IBM. And while IBM announced a CSA-equivalent in the small system market, the Mid-Range Systems Amendment, IBM has less impact on the small systems market than they do in the large systems market.

An area of great interest is the telecommunications service market. At \$1.5 billion, the telecommunications service sector is currently relatively small, but expected product growth, combined with increased user requirement for service and increased vendor capabilities in providing telecomm support, should spur rapid growth in this market. Most manufacturer and third-party service organizations have targeted telecomm service as their next high growth area, as shown by new and increased service offerings by IBM, DEC, and Sun Microcomputer (leading vendors in the large, small, and work station markets) as well as Unisys' recent acquisition of T1 and network management vendor Timeplex.

Microcomputer service continues to slow, even though product sales increased again in 1987, as a result of the growing number of inexpensive clones in the market, as well as continuing product dispersion and price sensitivity problems. These factors combine to limit micro service profitability, and most micro service attention is paid by those vendors either attempting to penetrate new accounts or satisfy existing large accounts by providing single-source support.

B

Leading Systems Service Vendors

While product sales improved slightly over 1986, most service vendors found that while service revenues continued to grow, service growth was beginning to slow. Increased competitive factors, combined with continuing slowed new product shipments, began to slow the service growth which had almost been taken for granted. Service vendors found that they had to make some painful concessions in the form of increased warranties and reduced service prices, which have just begun to make an impact on current service revenues but are expected to significantly reduce short-term future growth expectations.

The leading service vendors (shown in Exhibit II-2), showed varied success in dealing with this concern. IBM, the leading supplier of both computer equipment and service, found that their worldwide and domestic (1986 U.S. service revenues were just over \$5.3 billion, growing only 11% over 1985), exhibited slowed service growth in 1986 (over 1985). This slowdown in service growth has continued through 1987, demonstrated by IBM's 1987 three quarters' results growing just 5% over 1986, compared with 21% three quarter growth in 1986.

EXHIBIT II-2

LEADING SERVICE VENDORS

RANK	VENDOR	1986 SERVICE REVENUE (\$ Millions)	SERVICE AS A PERCENT OF TOTAL REVENUES	1985-1986 SERVICE GROWTH (Percent)
1	IBM	5,316	21	11
2	DEC	2,129	28	22
3	NCR	1,725	35	16
4	Unisys	1,645	23	22
5	Hewlett-Packard	1,480	26	20

*U.S. figure

Contributing to this slowdown in IBM service growth is the heavy discounting called for in the Corporate Service and Mid-Range Systems Amendments. IBM hopes that service margin growth will increase and service costs decrease as a result of the increased participation required of CSA/MRSA users in the support process.

Digital Equipment Corporation, on the other hand, appears to be continuing sales and service growth through both 1986 and 1987. DEC, buoyed by steadily increasing sales of their VAX 8XXX family of small systems, reported that first quarter service revenues of 1988 were up 23% over the previous year's total. DEC has also been successful at avoiding the discounting war spurred by IBM's CSA announcement.

Other manufacturer service organizations have also been successful at maintaining service growth. In the large systems market, Amdahl and Unisys had good years, helped by new product introductions. Of these two, Amdahl appears to be most in danger going into 1988, as IBM's CSA agreement should provide an additional inducement to users choosing between an IBM 3090 and an Amdahl 589X (or a NAS AS/XL). In the small systems market, HP redounded but others in the industry, most notably DG, Concurrent, and Wang, showed continued effects of product sales slumps.

C

System Availability Trends

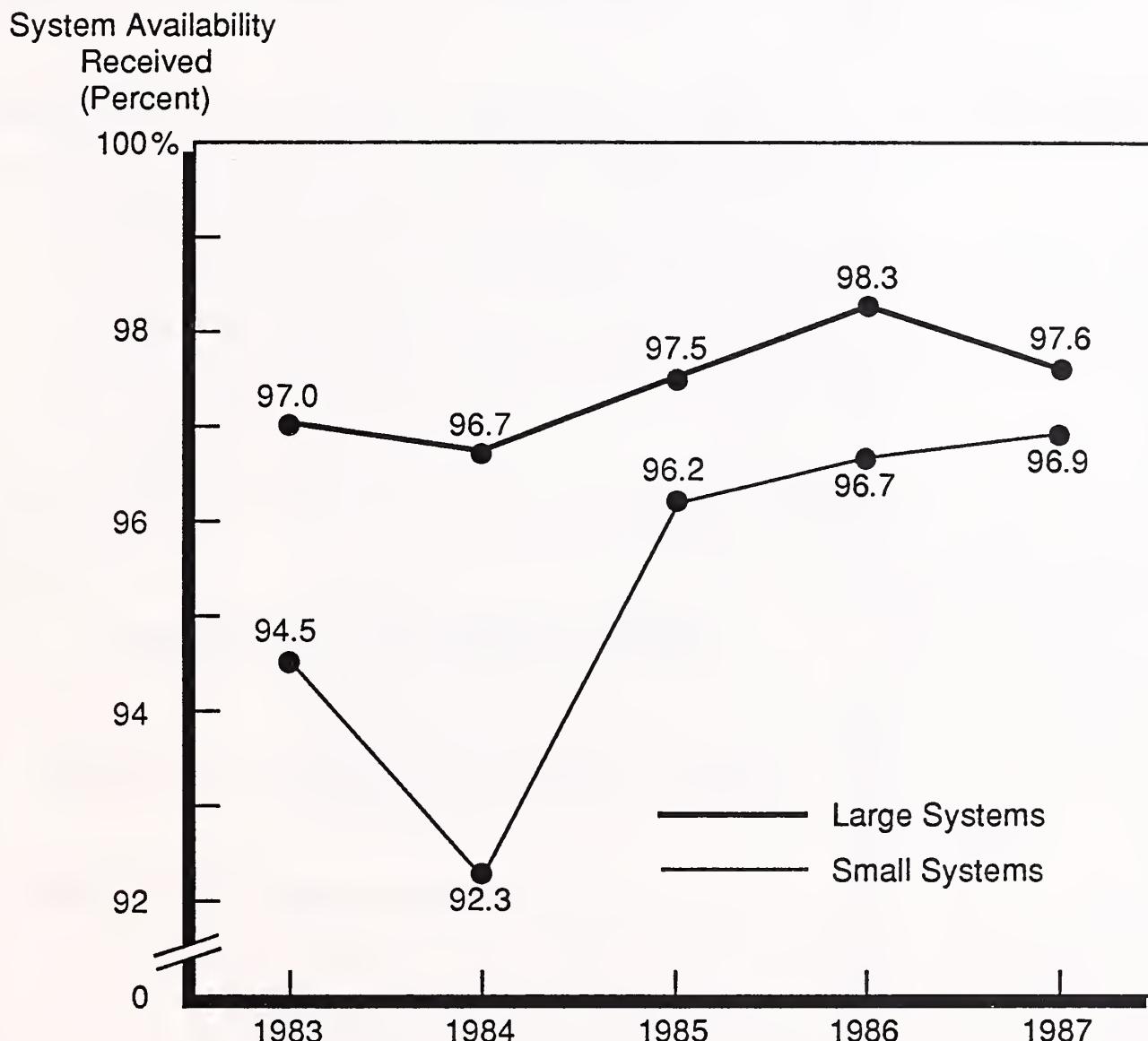
In 1987, INPUT surveyed 710 users of large and small systems regarding their current satisfaction with service that they received from their (manufacturer-based) service vendor. These users, in keeping with similar users the past five years, placed the highest priority on maintaining optimal systems availability. System availability requirements for both large and small system users has risen steadily over the past five years, with large systems requirements rising from 96.8% in 1983 to 98.3% in 1987, and small systems requirements rising from 93.8% to 97.9% over the same period.

Exhibit II-3 graphs large and small system vendor performance as a function of the system availability reported by users. Note that in both large and small systems, actual system availability performance fell below the users' reported requirements (large systems users required 98.3% and received 97.6%; small systems users required 97.9% and received 96.9%). This is particularly significant in a year when newer products were represented in both product samples (the dip in the small systems actual system availability in 1984 was attributed to the presence of older products from Datapoint, Burroughs, and DEC).

It is difficult to say what caused the dip in large system user-reported system availability. Most products analyzed already utilize some degree of remote support technology; some manufacturers even use fault-tolerant or redundant system design (eg. Tandem and Concurrent Com-

EXHIBIT II-3

SYSTEM AVAILABILITY TRENDS 1983-1987



puter Corporation in the small systems market, while most large systems vendors offer multiprocessor systems). In the large systems sample, users reported that average vendor response time was slower in 1987 (averaging 1.7 hours) than in 1986 (1.2 hours). Small systems users, however, reported that both response and repair times were faster in 1987 than in 1986.

Perhaps the trend towards increasing user involvement in the diagnosis and support of their own equipment will help service vendors meet the users' increasing system availability requirements. For the most part,

vendors have optimized the effect that improved response times will have on system availability, short of dedicated on-site engineers (as practiced by Cray Research). Improved system design will undoubtedly improve the reliability and serviceability of future systems. And increased use of service automation will also limit the effects of a system failure.

D**An Aggressive New IBM**

In 1987, industry-leading IBM made a number of service procedural and pricing policy changes that shook both the manufacturer-based and third-party maintenance service industry (listed in Exhibit II-4). Starting in late 1986, IBM announced the previously mentioned Corporate Service Amendment, followed in 1987 by the Mid-Range Systems Amendment, which offered users of IBM large and small systems significant service discounts of up to 45% for signing a long-term service contract (of up to five years) and agreeing to assume some responsibility for the management and support of their own system. These amendments provided IBM with a method of cutting service prices to levels that compete with TPMs while providing IBM a way of at least reducing some of the costs of providing service. TPMs were forced to counter with similar policies.

EXHIBIT II-4**IBM'S AGGRESSIVE NEW STANCE**

- Service Discounting Policies (CSA, MRSA)
- Expanded Contract Coverage (11x5 to 24x7)
- Elimination of Non-Prime T&M
- Tightened Spares Pipeline

Later in 1987, IBM announced that all service contract customers that were eligible to receive 24-hour by 7-day coverage as an option would now receive it at no charge. The move was not completely unexpected, since IBM already offered around-the-clock coverage to all CSA customers, but the new policy should prove attractive to many prospective

IBM systems users, particularly in the highly competitive small systems market.

At the same time as the 24x7 coverage announcement, IBM also announced that in order to “dedicate resources to meet the IBM service agreements announced (that day)”, it was eliminating non-prime (outside of 7AM to 6PM) time-and-materials (T&M) coverage, with few exceptions. This announcement will have greatest impact on service brokers and leasing companies who use IBM T&M service to support their customers, as well as traditional TPMs who supplement their own service coverage with IBM T&M resources.

The last major announcement by IBM regarding service was the reduction of spare parts centers where users and other service organizations could purchase spare parts from 100 outlets nationwide to only 21. By centralizing their spares in this manner, IBM reduces costs and improves its ability to locate a needed part, while at the same time limits TPM access to spares.

E

Evolution of Service Price Model

Service pricing strategies can be closely associated with the development of the service organization from cost-center to profit-center (which now describes nine out of ten service organizations). As Exhibit II-5 chronicles, most service organizations were originally operated as cost-centers, as most service pricing was calculated to cover costs, or, at best, provide some notional amount of profit. During this time, most of the service provided was hardware maintenance performed on-site by a field engineer trained in system-level diagnosis and repair. Whatever non-hardware maintenance services (usually planning, training, and some software support) provided were usually provided for free.

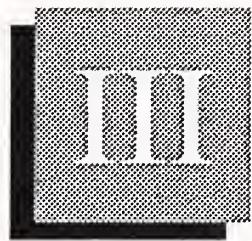
By the early 1980s, service organizations discovered that service in itself could be performed profitably, and marketed and sold as a standalone product. Service became even more profitable as service organizations discovered new ways (automated dispatching and parts tracking systems, remote diagnostics and support delivery, and some level of artificial intelligence-based diagnostics systems) to improve service efficiency and performance. In addition, advanced product design improved the reliability and serviceability of large and small systems, so that when on-site support was needed, the field engineer often only needed to replace a component. This allowed the service organization to learn new skills, such as software support and other user support services. As user requirements for these non-hardware support services grew, service organizations recognized the revenue and profit-potential and unbundled (separately-charged) these services.

EXHIBIT II-5

EVOLUTION OF SERVICE PRICE MODEL

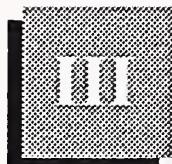
SERVICE PRICE ATTRIBUTES	TIMEFRAME
<ul style="list-style-type: none"> • Cost-Based • Hardware-Emphasis • Non-Hardware Activities Free 	1970s
 <ul style="list-style-type: none"> • Profit-Based • "Unbundled" Services • Non-Hardware Activities Charged 	1980s
 <ul style="list-style-type: none"> • Hardware Maintenance As a "Price Leader" • Profit from Software Support, Professional Services, Parts Sales • Performance Support Packages 	1990s

As user pressure for maintenance price reductions continues (spurred by recognition of increased hardware reliability), service organizations will need to reduce hardware maintenance prices to levels that become, in effect, "price leaders." Service organizations will then price the other high requirement support areas (software support, network planning, parts sales, and system integration, to name a few), at levels that recover lost revenue and profit. By doing this, service in itself will evolve away from reactive maintenance towards predictive performance support.



Current Service Market Size and Forecast, 1987 - 1992





Current Service Market Size and Forecast, 1987-1992

A

Total Service Market

1. Current Market Size

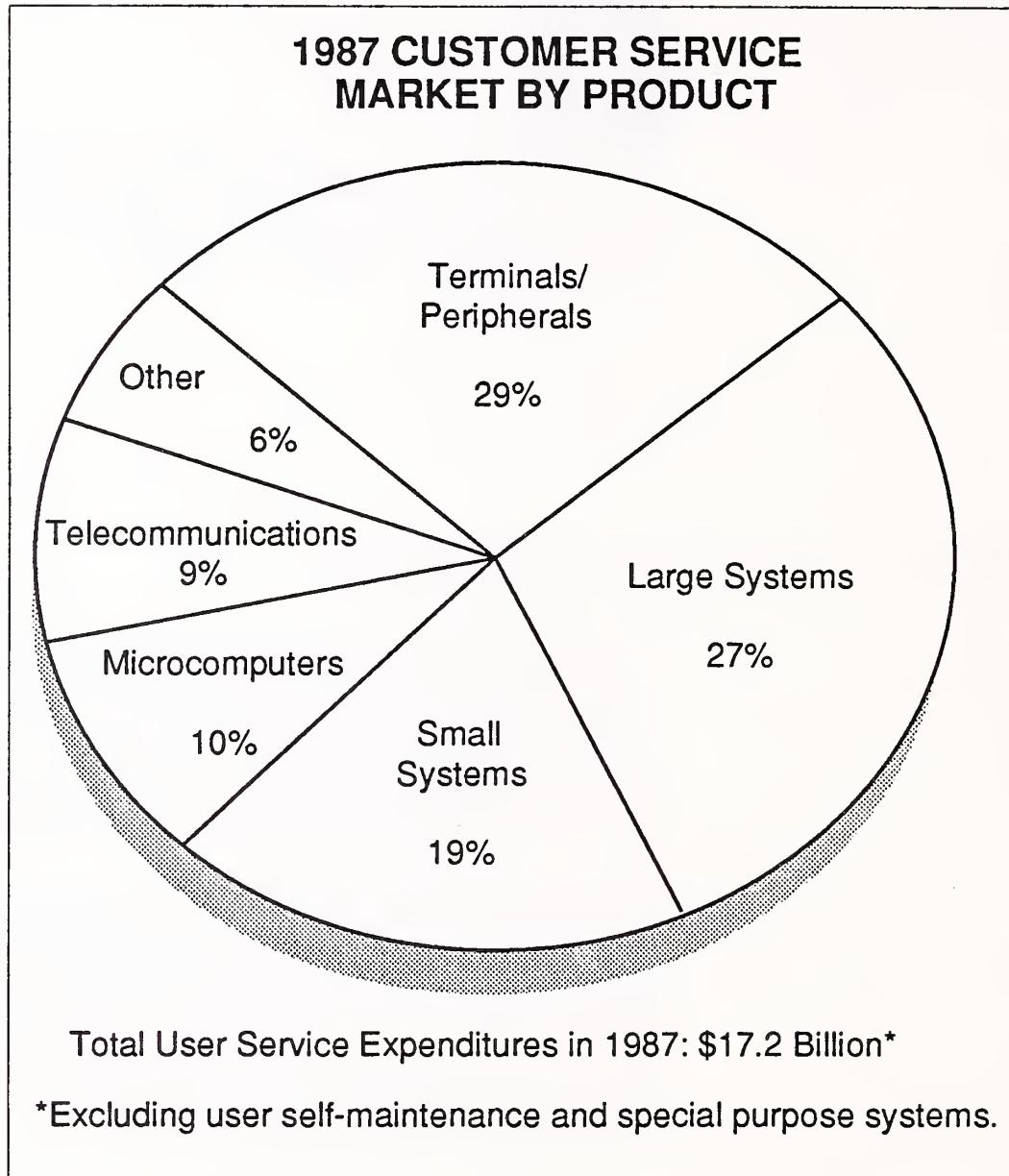
In 1987, total U.S. customer services user expenditures for both manufacturer-based and third-party maintenance were \$17.2 billion, up 13% from INPUT's 1986 figure (\$15.2 billion). These figures exclude user self-maintenance, which INPUT estimates at 1.5% of total user expenditures, and service performed on special purpose systems, such as those sold to the federal government for classified applications.

Exhibit III-1 breaks down the 1987 service market by product type. Peripherals (terminals, printers, and storage devices) constitute the largest share (29%) of the U.S. market, with just under \$5 billion in user expenditures in 1987. This growth in peripherals service dollars is the partial result of slowed systems sales in the 1985-1986 time frame, when many users held off on replacing large and small systems and instead upgraded them with additional memory.

Large systems used to be the largest contributor to the total service revenue; however, slowed growth in product shipments and increased user pressure for discounts has slowed service revenue growth in this product market. Still, large system service accounts for over \$4.6 billion in 1987, and represents a lion's share of most systems manufacturer's service business.

Small systems service contributed just under \$3.3 billion in 1987, up from \$2.8 in 1986. Service growth in this product market has been buoyed by product shipment growth in the superminicomputer subsegment (represented by such products as the DEC VAX 8XXX and IBM 9370 lines), increased use of service automation (such as remote diagnostics), as well as growing user requirements for non-hardware maintenance services (such as network planning and implementation). While future small system service growth may be slowed by competitive

EXHIBIT III-1



discounting (eg. IBM's Mid-Range System Amendment) and one-year warranties now becoming the standard in the high end of the small systems market, small systems service is perhaps the most attractive service market for both manufacturers and TPMs, because of expected product shipment growth and increased demand for more profitable services.

Microcomputer service constituted \$1.75 billion (or 10% of the U.S. total service market) in 1987, up from \$1.4 billion in 1986. Continued increased corporate usage of micros contributes to the growth in user expenditures in micro service. However, micro service still continues to be one of the least profitable service markets, due to dispersed product densities, high price sensitivity, and product growth in the "name" (i.e., AST, Leading Edge) and "no-name" clone market.

The telecommunications service market (comprised of modems, switches, networks, front-end processors) added just over \$1.5 billion in 1987, up from \$1.3 in 1986. This market continues to be a prime target for both systems manufacturers and TPMs, due to the growing use of networked systems, yet service growth in this market continues to be slowed to some extent by shortages of skilled technicians and automated service tools available.

More significantly, the telecommunications service market has been hindered by the lack of completely integrated service offerings from leading vendors. As a result, the telecommunications market would be more correctly examined product-by-product, since the services provided vary so much between products. For example, modems are predominantly serviced depot-style, LANs are predominantly software support-based, front-end processors are predominantly serviced on-site, etc. Users are looking for service vendors that can provide all of the services required to support all products at their site. As of yet, few (if any) vendors can provide such a complete offering.

Service from other products accounted for the remaining 6% of the total service market. Products in this group include dedicated word processors, CAD/CAM, and combined voice/data workstations.

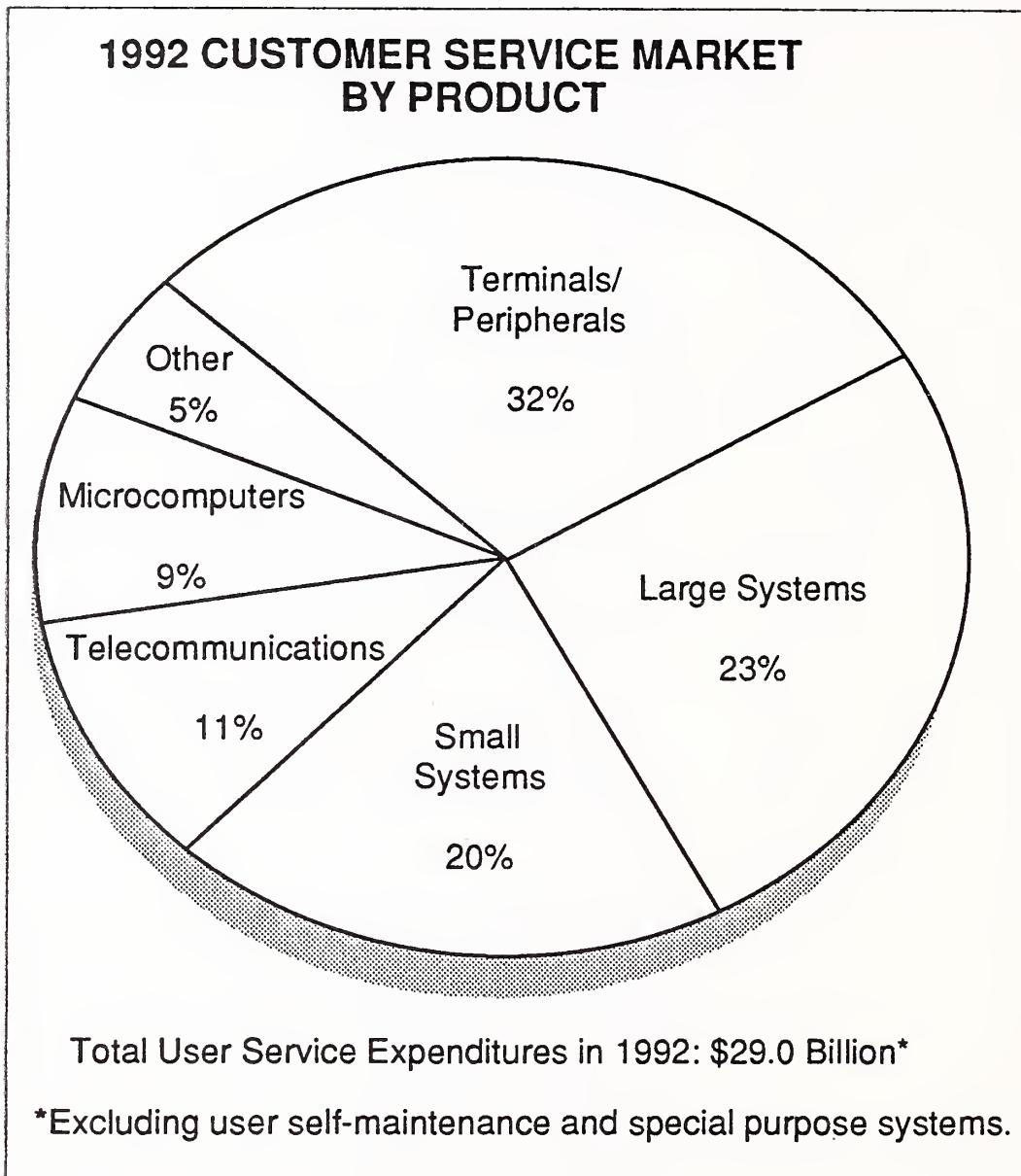
2. Forecasted Market Size

By 1992, the product breakdown of customer services will have continued to change, as shown in Exhibit III-2. The service market share attributed to peripheral products will grow to \$9.4 billion, or 32% of the total service market. This represents an average annual growth rate (AAGR) of 14% during the five-year forecast period.

The growth in peripherals service can be credited to both a renewed growth in system shipments in certain system segments as well as increased add-on storage sales in those market segments resisting system replacement. The peripherals market will also benefit from increased use of service automation, particularly those systems that incorporate artificial intelligence (AI) to allow predictive support.

Large system service growth will decline to 8% AAGR during the forecast period, as a result of slowed product shipment growth in many but not all market segments (some applications, such as on-line transaction processing, should exhibit promising growth), as well as increasingly competitive service policy, pricing and discounting schemes. Large system service margin will result from increased vendor activity in such non-hardware maintenance service areas as performance optimization, network planning and implementation, and system integration services.

EXHIBIT III-2



Small systems service revenue, on the other hand, will increase at a 12% growth rate during the next five years. The small systems market, particularly at the high end, will benefit from increased use of networked systems. Service opportunities involving network services will contribute dramatically to user expenditure growth in this market. Aggressive service pricing and warranty length changes will tend to restrict growth to some degree.

Microcomputer service user's expenditures are expected to grow only 9% per year during the forecast period, a much lower growth expectation than predicted in previous service market studies. A number of factors have contributed to this much more conservative growth expectation especially greater than expected use of clone systems by users, including business users, and lower than expected attraction of business users to service contracts, caused by continued service price-sensitivity

to name just two. The costs of supporting such a dispersed and price-sensitive user base have made it very difficult to operate profitably in the micro market, and, as a result, most service organizations look at micro service as a way of penetrating new accounts or as a way of meeting the single-source needs of their existing systems customers.

As stated previously, the telecommunications service market has been an attractive target market as both manufacturers and TPM organizations have been allured by the growth in networks and other telecommunication markets. INPUT is forecasting a 16% AAGR for telecommunications service during the forecast period. Major contributors to this growth expectation include increased numbers of trained technicians, increased use of strategic relationships with firms that already have such in-demand skills as network planning and implementation services, and increased product and service involvement from such vendors as IBM, DEC, and AT&T.

Exhibit III-3 summarizes the service market size and forecast expectations for the entire U.S. customer service market as well as a breakdown by product market.

EXHIBIT III-3

CUSTOMER SERVICE USER EXPENDITURES 1987-1992*

PRODUCT SECTOR	1987 (\$ Billions)	1992 (\$ Billions)	1987-1992 AAGR (Percent)
Large Systems	4.6	6.6	8
Small Systems	3.3	5.7	12
Microcomputers	1.7	2.6	9
Telecommunications	1.5	3.2	16
Peripherals	5.1	9.4	14
Other (WP, Workstations)	1.0	1.5	6
Total	17.2	29.0	11

*Excluding user self-maintenance and special purpose systems.

1. Current Market

The U.S. third-party maintenance (TPM) market is expected to grow to just over \$1.8 million in 1987, which represents a 17% growth rate over 1986. This growth has been spurred by acquisitions and mergers that have increased the size and visibility of market leaders, such as TRW, Sorbus, and General Electric, to name a few. As a result, the major players in the TPM market have been able to attract users for reasons that went beyond pricing, including reasons of service quality. Furthermore, TPMs are competing more for current products on the market, not just older products that are effectively being dropped by the manufacturers.

Exhibit III-4 provides a breakdown of the 1987 U.S. TPM service market by product. In total, TPMs have captured just under 11% of the total U.S. customer service market.

EXHIBIT III-4

TPM USER EXPENDITURES 1987-1992

PRODUCT SECTOR	1987 (\$ Millions)	1992 (\$ Millions)	1987-1992 AAGR (Percent)
Large Systems	183	204	2
Small Systems	265	489	13
Microcomputers	568	974	11
Telecommunications	225	494	17
Peripherals	511	920	12
Other (WP, Workstations)	73	140	14
Total TPM	1,825	3,222	12

In 1987, TPMs are expected to derive only \$183 million in large system user expenditures, which is less than 4% of the total large system service market. TPMs have not been successful at penetrating the large systems product market for a number of reasons. First, large system users are less price-sensitive than other product users, and have a greater requirement for services that TPMs do not offer, such as software support,

training, planning, and consulting. TPMs are usually shut out at the decision time, since most large system users are more apt to negotiate and purchase service at the time of system acquisition. Also, large system users are extremely concerned about parts availability, particularly on newer high-end products. Lastly, a TPM would have less access to remote diagnostics and other necessary support tools than the manufacturer.

TPMs have been more successful at penetrating small systems sites, as small systems users are more price-sensitive than their large system counterparts. In 1987, TPMs will account for \$265 million of total small systems user expenditures for service (or around 8% of that market). In 1987, TPMs targeted such growth markets as the IBM System/36 and DEC VAX families.

Two product markets where TPMs have been traditionally strong have been the peripherals market and the microcomputer market. TPMs account for \$568 million, or roughly one-third, of the total micro service market. In the past, microcomputer manufacturers could not (as in the case of Apple and COMPAQ) or preferred not to (as in the very early days at IBM) service the extremely dispersed installed base of micro products. As a result, TPMs, along with certain retailers, were the predominant source of service and support for micros.

More recently, IBM has assumed a much greater involvement in the support of their micro users, and other large manufacturers, such as Tandy, DEC, HP, and NCR, have acted to increase the amount of service provided to end users directly from the manufacturers. Still, TPMs continue to sign service agreements with small manufacturers who cannot provide direct support to their users, and micro service continues to be a significant, if not profitable, part of most TPMs' business.

TPMs have also been most successful at penetrating the peripheral service market, capturing \$511 million, or roughly 10%, of the total peripherals service market. TPMs have been successful at penetrating price-sensitive user sites with extremely competitive prices, often with the goal of just "getting the foot in the door." Also, TPMs (most notably TRW) have been successful at signing service agreements with peripheral manufacturers who do not have service organizations of their own. Lastly, TPMs were successful at securing service business from users with "mixed-shops" (peripherals and systems from different manufacturers) since TPMs could provide single-source support (although this is less true today since most manufacturers provide some level of support on "foreign" devices).

TPMs have been somewhat less successful at penetrating the telecommunications service market, with only \$225 million of telecomm user expenditures for service. While TPMs have been able to garner a sig-

nificant share of the modem business, most TPMs suffer from the industry-wide problem of a shortage of skilled telecomm technicians. Still, the telecomm service market is a primary target market for most TPMs, and TPMs should do well in this market, since a traditional strength of TPM has been multi-product, multi-vendor support capabilities.

2. Forecasted Market Size

Exhibit III-4 also gives the 1992 TPM service forecast at just over \$3.2 billion, which represents a 12% average annual growth rate during the forecast period. While this growth expectation still exceeds the growth expected for the entire customer service market (at 11% AAGR over the same five-year forecast), the TPM service growth expected is significantly lower than previously forecasted.

A major reason for this much more conservative forecast is that TPMs are facing increased competition and pressure from manufacturers (most notably IBM) who are intent on winning back service business. Most notable of these efforts have been the recent announcements from IBM involving significant service discounts (the Corporate Service and Mid-Range Systems Amendments), and expanded coverages (effectively offering around-the-clock coverage on all systems service contracts). In addition, IBM also announced policy changes (the elimination of non-prime time and material coverage and the reduction of the number of locations that sell spares) that will also impact the TPM industry.

In addition, TPMs face increased competition from manufacturers who in effect have entered the TPM business themselves. DEC was the first of these major vendors, followed most recently by Data General. And while IBM currently offers "TPM" service on selected non-IBM products commonly found on IBM PCs, IBM's entrance into TPM is inevitable. (A spokesman for IBM stated that IBM will assist customers in "integrating" non-IBM products with IBM products.)

TPM growth will also be impacted by expected pricing changes from manufacturers which will lower hardware maintenance rates with the hope that users will purchase other, more profitable services, such as software support, consulting, network planning, and spare parts. TPMs will need to lessen their reliance on hardware maintenance revenues by offering other services to users.

During the forecast period, TPM service growth is expected to be greatest in the telecomm market (with 17% AAGR), small systems market (13% AAGR), and peripherals market (12% AAGR).

C**Large System Service Market**

In the past, the large systems service business has been fairly insulated from product shipment fluctuations and has exhibited constant user expenditure growth. This is largely due to the tremendous value placed by users on service, which tended to limit price sensitivity and created a demand for many additional support services (such as software support, training, and consulting services) that carried higher margins.

Two factors have increased user price sensitivity in the large systems market: increased competition between manufacturers in the large systems product market and between manufacturers and TPMs who have increased their capabilities in servicing large systems; and increased user awareness of improved hardware reliability. Industry leader IBM demonstrated their recognition of this increased price-sensitivity with the announcement of their Corporate Service Amendment, which offers large system users discounts of up to 45%.

At the same time, user requirements for system availability continue to increase toward the 100% system availability level. Since improved hardware reliability, combined with increased use of service automation (such as remote support delivery), has decreased hardware maintenance costs, at least on the labor side, large system service vendors are increasing their involvement in non-hardware maintenance service areas, where user requirements are high and price sensitivity is lower.

Exhibit III-5 provides a breakdown of both current and forecasted large system manufacturer service revenue by the following service areas: hardware maintenance, (systems) software support, professional services (planning, consulting, performance optimization, and systems integration services) and education (hardware and software training).

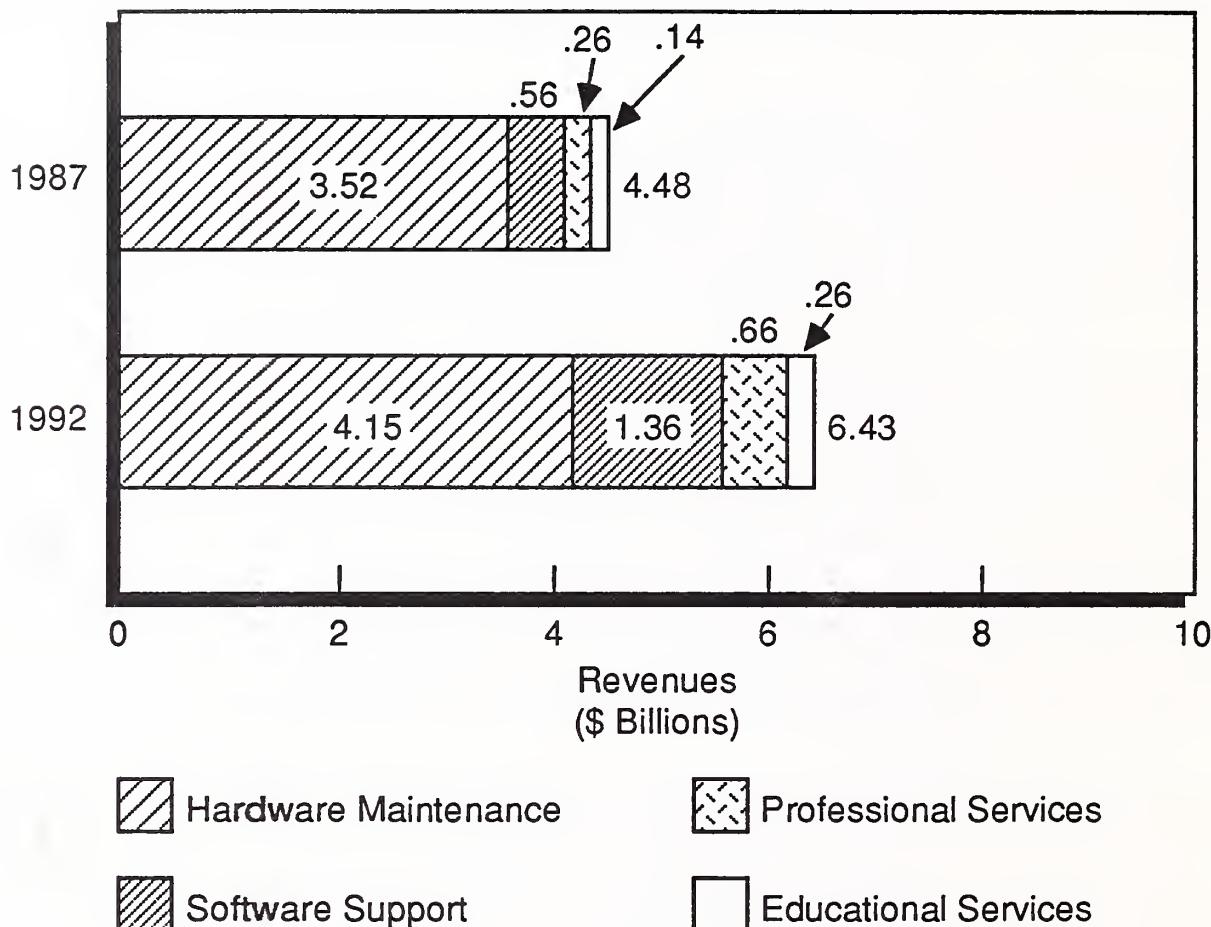
1. Hardware Maintenance

Hardware maintenance continues to provide the lion's share of large systems service revenues, accounting for \$3.52 billion (78%) of all large systems service. The dominance of hardware maintenance activities has been declining steadily (hardware maintenance accounted for 83% of all large systems service in 1985 and 81% in 1986) and should continue to decline throughout the forecast period to represent only 64% of all service in 1992 (still accounting for \$4.15 billion).

Increased hardware reliability, increased user pressure to reduce maintenance prices, and increased competition from TPM and other manufacturer service organizations should contribute to this decline in hardware maintenance growth rate, which Exhibit III-6 shows as 3% AAGR for the next five years.

EXHIBIT III-5

LARGE SYSTEMS SERVICE EXPENDITURES* 1987-1992

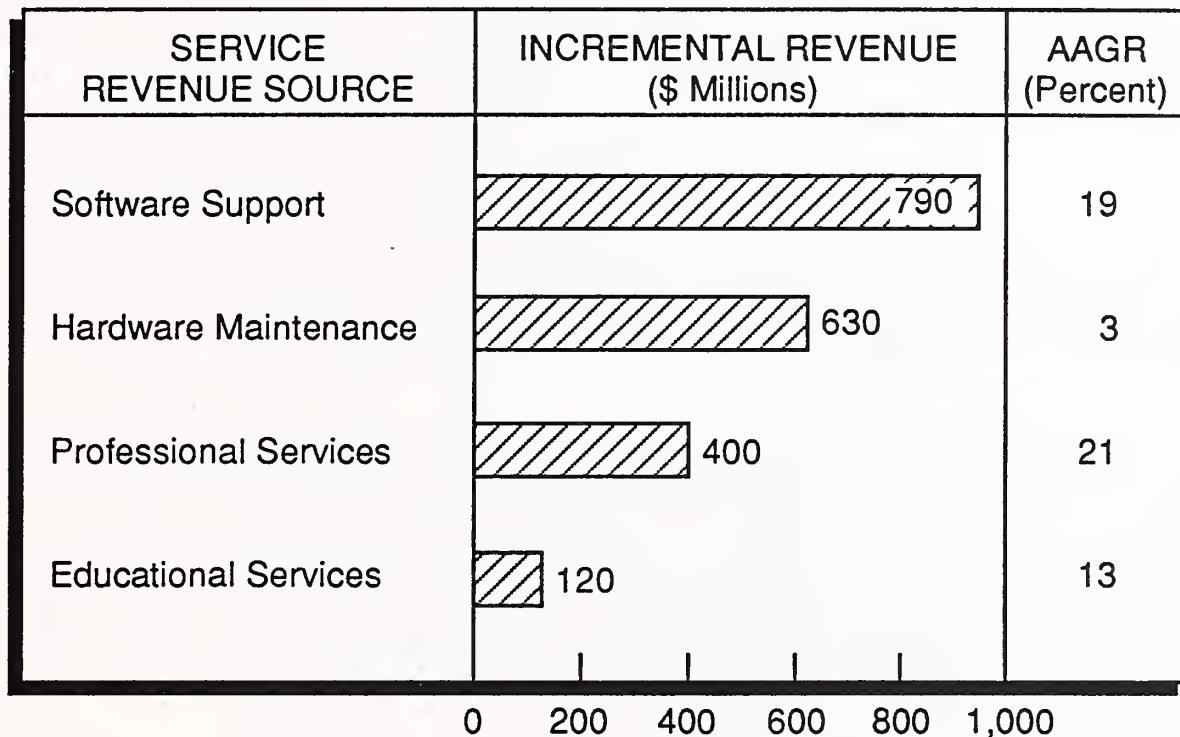


*Excludes TPM and user self-maintenance.

This still should not minimize the importance of hardware maintenance, particularly in the large systems market, where even 3% average annual growth will contribute \$630 million over the forecast period. Indeed, hardware maintenance will continue to be the bread and butter of large systems service organizations, regardless of user pressure, price changes, and reduced service content. Eventually, hardware maintenance will be thought of much in the same way that some view systems—that is, vendors sell the CPU to make money on the peripherals, software, and services that go along with the CPU. Hardware maintenance will be priced at such a level that service organizations will make their money on software support, educational, and professional services.

EXHIBIT III-6

**LARGE SYSTEMS SERVICE GROWTH
BY REVENUE SOURCE***
1987-1991



*Excludes TPM and user self-maintenance.

2. Software Support

Software support contributed \$560 million, or 13% of all large systems service in 1987. This represents a growth in software support over 1986, in terms of actual user expenditures and as a percentage of the total service dollar (up from 12%). INPUT expects that large systems software support will grow at a 19% per year clip over the next five years, contributing \$800 million in new service expenditures by 1992. This will increase software support's contribution to total service to 20% by 1992.

Large system users have reported steadily increasing requirements for software support, as a result of increased use of more sophisticated applications. In addition, many software support organizations have sensed a reduction in user organizations' programming skill level. As a result, users require more software support, providing much opportunity for support vendors who address this growing need.

A number of manufacturers have increased their involvement in the software support area to take advantage of revenue opportunities. IBM, for example, demonstrated its recognition of the importance of software in the future of its organization by establishing its Applications Systems Division to develop and support applications for its entire line of products. Even traditionally hardware-oriented, plug-compatible large system vendors NAS and Amdahl have voiced their desire to become more involved in software support.

Software support offers both revenue and profit growth opportunities. Support costs are usually lower than those for hardware maintenance, since material costs are minimal, and software support is less labor-intensive, as much of the support needed can be supplied in the form of telephone support, user-accessible problems databases, and remote support services (i.e., automated error catching and downline loading of fixes).

In addition, users appear to be much less price-sensitive in the area of software support, as long as they perceive that they are receiving premium levels of support. INPUT's research of software support users the last two years have indicated that users paying the highest amount for software support (Candle users in 1986, paid 20% annually, and Pansophic users in 1987, paid 15%) were also the most satisfied with their support, with both groups overwhelmingly reporting that they received their "money's worth."

3. Professional Services

While user expenditures for professional services represents only a small part (\$260 million, or 7%) of 1987 large systems service, professional services are forecasted to exhibit the fastest growth over the 1987-1992 forecast period, at 21% AAGR. Thus by 1992, large systems professional service will more than double in user expenditures to \$660 million, and represent 10% of all service, up from the current 6%.

Professional services growth has been aided by the increased "unbundling" of consulting services, as well as introduction of more innovative performance-related services, such as performance monitoring and optimization services. In the past, most professional services were performed free, usually in the form of environmental, site, and installation planning, or such post-sale consulting services as on-going needs assessment analyses.

Now, service organizations have expanded the scope of professional services to include ancillary planning services such as network planning, implementation, management, and support. In addition, future service activities will undoubtedly include many services in the area of systems integration.

4. Educational Services

Educational services represents the smallest part of the large systems service market at \$140 million in 1987, yet this market does provide some opportunities for growth during the forecast period. In the past, most educational services were supplied to users during and just after system installation, most often without charge. More often, the training supplied was operational in nature, and, since it was delivered as part of the sale of the system, it was rarely possible to attract users to ongoing training services for a fee.

Eventually, operational training became more performance-oriented in nature, and, as a result, service vendors became more successful in selling on-going training as a standalone product. Now, most large and small system vendors offer catalogs of operational, performance, and even support courses to their users.

Educational services are attractive as a future source of service revenue for a number of reasons. First, user price-sensitivity in the area of post-sale training is lessening for performance-oriented training, particularly in key areas of network design, implementation, and management. Also, educational service costs are declining as delivery methods move away from labor-intensive classroom training towards video-based, computer-based, and computer-aided instruction. Advancements in videodisk technology (which eventually will provide read and write capabilities) will both improve the "user-friendliness," adaptability, and costs of using computer-based training.

D

Small Systems Service Market

Growth in the small systems service market has been fairly split; slow growth at the lower end (represented by such traditional minicomputer products as the IBM System/36 and DEC PDP 11/7X) and much faster growth at the upper end (represented by a large number of supermini-computer products like the IBM 9370, DEC VAX line, and competitive products from such vendors as Data General, Prime, Gould, HP, and Concurrent Computer Corporation). In 1987, the small systems service market grew to \$2.96 billion, up 13% from 1986. By 1992, the small systems service market will grow to \$5.13 billion, representing a 12% AAGR.

The small system market is becoming increasingly competitive between market leaders DEC and IBM, between other vendors who compete for more niche-oriented markets, and between manufacturers and third-party maintenance organizations that are increasingly attracted to the faster growing products.

The superminicomputer segment of the small systems market is particularly competitive, both in product/performance advancements and in service delivery. This is due in part to the relative youth of the market, since most products in the market were able to incorporate serviceability design concepts (modular design, remote diagnostics, etc.) learned from large systems development. Small systems vendors, led by companies like DEC and HP, were also influential in the development of the service "menu" concept of unbundling services to allow users to pick the type and amount of services they need from a large list of service offerings.

Rapidly increasing system availability requirements have also helped drive the development of service in the small systems market. Small systems users now require systems availability of 97.9%, which is just under large systems 1986 requirements of 98.3%. As a result, many vendors are not only incorporating remote diagnostics to aid in problem determination, but also artificial intelligence (AI)-based tools to help predict problems and redundant system design to lessen the impact of failures.

Exhibit III-7 breaks down the small system service market by service area (hardware maintenance, systems software support, professional services, and educational services) for both current and forecasted user expenditures. Exhibit III-8 outlines incremental revenue and growth forecasted in these four areas.

1. Hardware Maintenance

Hardware maintenance activities account for \$2.31 billion in 1987, representing 78% of all small systems service. The proportion of service dollars provided by hardware maintenance activities is expected to decrease over the next five years as a result of the increased use of remote support and redundant system design which will allow small systems service vendors to become increasingly competitive in their maintenance pricing. The first example of this price-competitiveness was the announcement by IBM offering significant service discounts to users under the Mid-Range Systems Amendment.

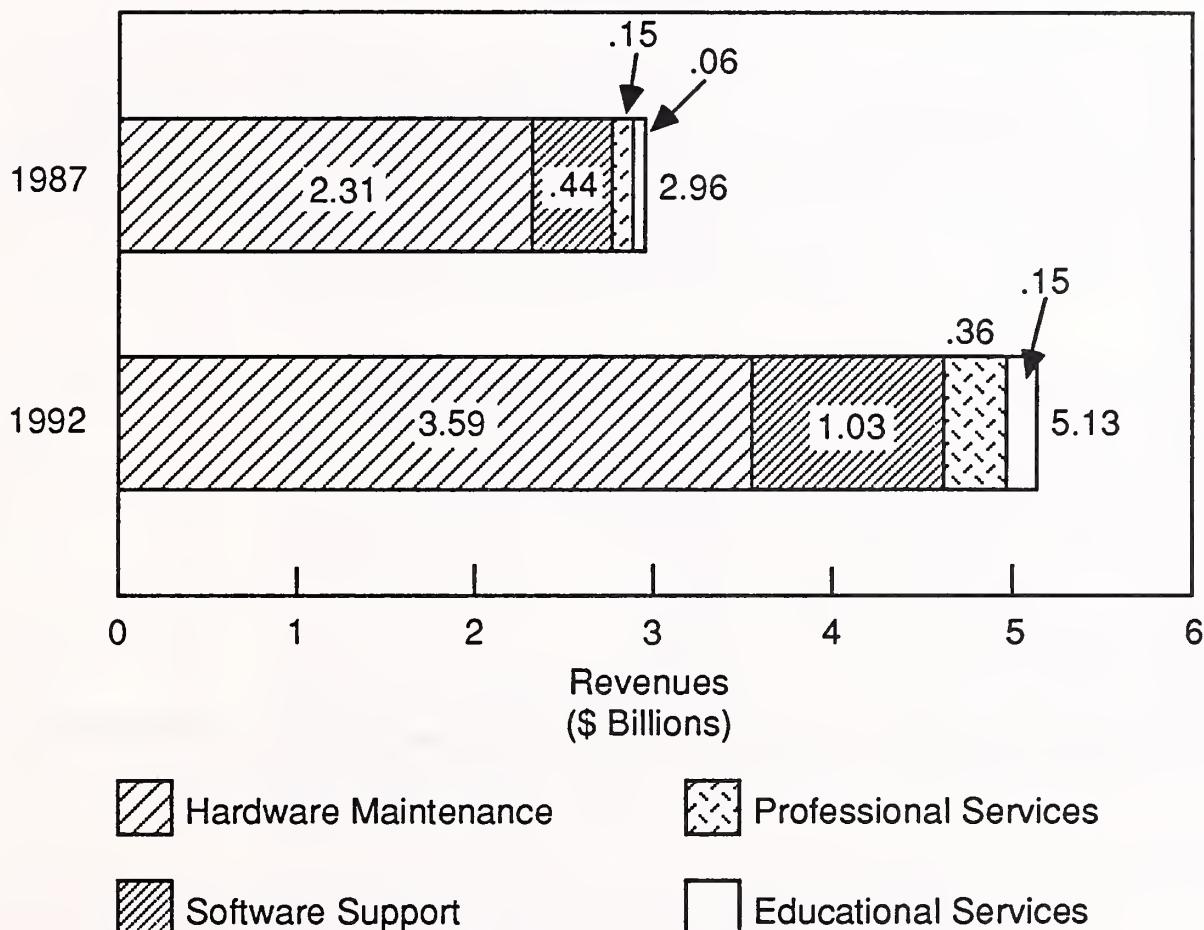
Over the course of the next five years, hardware maintenance user expenditures in the small systems market will grow at a slower rate than the total small systems market (9% AAGR to 12% for the total market). Still, this represents an increase of almost \$1.3 billion in incremental expenditure growth by 1992.

2. Software Support

Systems software support provides a relatively small part of small systems service, with only \$440 million in 1987 (or 15% of all small

EXHIBIT III-7

SMALL SYSTEMS SERVICE EXPENDITURES* 1987-1992

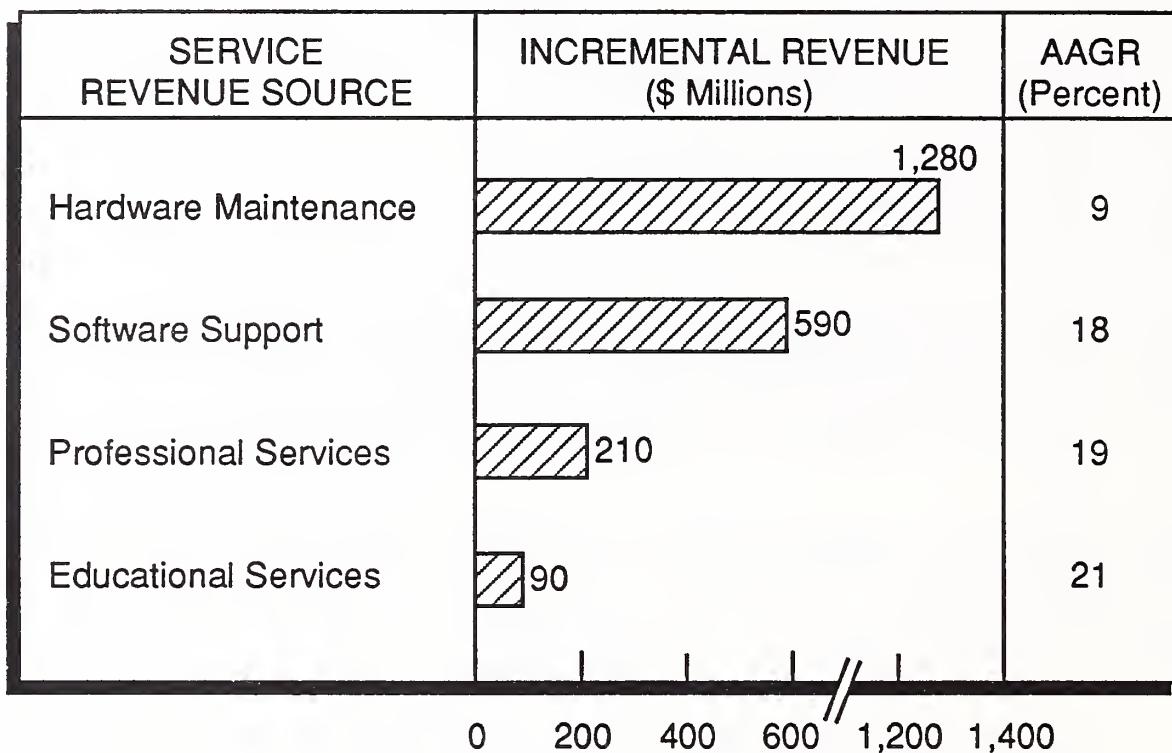


systems service). However, systems software support user expenditures have grown quickly in the last few years (1986-1987 systems software support growth was 19%), and INPUT expects that systems software support growth will continue through the forecast period at 18% AAGR. Thus, by 1992, software support will account for \$1.03 billion dollars, adding \$590 million in incremental service expenditures.

Primary contributors to the growth of small systems software support is the increased use of more sophisticated software applications, such as MRP II, office automation, and transaction processing, as well as the increased use of networked systems. In addition, small systems are moving towards simplified hardware and more complex software designs, such as reduced-instruction-set-computers (RISC) systems being developed by HP, among others.

EXHIBIT III-8

**SMALL SYSTEMS SERVICE GROWTH
BY REVENUE SOURCE
1987-1991**



If small systems manufacturers are successful in further developing their software support offerings, they will be more successful in holding off TPM activity in their market, since TPMs are still hardware maintenance-oriented. Furthermore, they will be more successful in meeting the steadily increasing small system user requirement before increased and improved software support. INPUT's 1987 Analysis of Small System Service indicated only 41% of users were satisfied with their overall software support.

3. Professional Services

While professional services accounts for a minor portion of 1987 small system service expenditures (\$150 million, or 5% of all small systems services), opportunities in professional services abound for service vendors with telecommunications support experience, since more and more users are moving toward networked systems.

Indeed, market leader DEC has announced a significant expansion of network services to their users. Not coincidentally, DEC is pushing a networked system of high-end superminicomputers built around their VAX 8978 to compete with IBM mainframes.

The only factor that limits the growth of professional services in the small systems market place is a shortage of skilled telecommunications support technicians, particularly those with networking experience. Since manufacturers and third-party service organizations are both trying to increase their network design and support capabilities, these qualified technicians are finding themselves in great demand.

Still, INPUT expects that small systems vendors will initially rely on "strategic partnerships" with network support specialists to carry companies through until the supply of qualified technicians increases. As a result, INPUT expects that small systems professional services will grow 19% per year through the forecast period, when, by 1992, professional services will account for \$360 million.

4. Educational Services

Educational services account for only 2% of all small systems service, with \$60 million in 1987. Part of the reason for this is that in the past most education and training services were performed for free at the time of system delivery. As a result, users came to expect that training was a free service, and did not connect a tangible dollar value for such support.

This assumption unfortunately failed to recognize the impact that education and training services have on both the support and the actual product itself. Furthermore, the support organization can only benefit from better-trained users, if only to cut down on user calls that are caused by user misunderstanding or misuse.

Small systems vendors have been somewhat successful in changing this. Two leading small systems vendors, DEC and HP, offer a wide range of operational and even support courses through an extensive catalog of training courses. End user satisfaction with these vendors in the area of training is slightly higher than the industry average, as reported in the earlier study, *Analysis of Small Systems Service*.

INPUT expects that educational opportunities abound in the small systems market, as a result of the increased use of more sophisticated applications as well the growth in networked systems.

E

Leading Large and Small Systems Vendors

Exhibit III-9 provides a list of the top fifteen large and small systems vendors ranked by their 1986 service revenues. In the large systems product market, the leading vendors are IBM, NCR, Unisys, Honeywell-Bull, CDC, Amdahl, and National Advance Systems (NAS). Most of the attention is focused on IBM, with their 309X family of mainframes, and the two plug-compatible (PCM) vendors, Amdahl (589X mainframes) and NAS (AS/XL mainframes). While most of the attention has been on hardware performance, reliability, and support, the true battleground will be the area of software and software support.

EXHIBIT III-9

TOP 15 SYSTEMS VENDORS*
BY 1986 SERVICE REVENUE**

RANK	VENDOR	1986 SERVICE REVENUE (\$ Millions)	1985-1986 SERVICE GROWTH (Percent)
1	IBM	9,514	11
2	DEC	2,129	22
3	NCR	1,725	16
4	Unisys	1,654	22
5	Hewlett-Packard	1,480	20
6	Wang	740	59
7	Honeywell-Bull	684	<9>
8	CDC	400	1
9	Data General	400	22
10	Prime	259	26
11	Amdahl	182	42
12	NAS	100	NA
13	Concurrent Computer Corp.	81	23
14	Cray	71	50
15	Gould	57	NA

*Large and small systems vendors, excluding CAD/CAM, workstations, word processors, microcomputers, and office automation equipment vendors.

**Revenue information derived from annual reports, from 10Ks, interviews, other public information, or INPUT estimates.

As PCMs, Amdahl and NAS sell mainframes manufactured by Fujitsu and Hitachi that can be directly interfaced (or “plugged” into) products manufactured by IBM. Each of these mainframes have been tuned to provide performance (speed) advantages over the IBM counterpart, as well as provide some degree of reliability improvement. Still, both companies, as PCMs, are tied to IBM in the area of software.

Since IBM is concurrently aggressively discounting hardware maintenance (eg. the CSA announcement) and increasing their presence in software, the PCMs are in the difficult position of having to also discount their hardware maintenance prices (without having other service areas available to recoup their losses) or by increasing their involvement in software and other support areas.

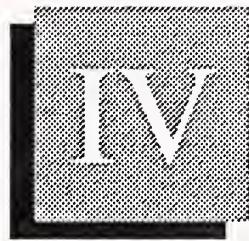
While both Amdahl and NAS offer some software in the form of system utilities, PCM users rely on IBM's operating system. Amdahl had been working on a proprietary operating system but dropped it to work on a UNIX system. NAS is working on a UNIX operation system in a joint venture with Sun Microsystems.

In the past, the PCMs have shown limited involvement in the area of software support, with the bulk of software support provided by both vendors delivered through a centralized telephone support center. Both Amdahl and NAS will need to increase their offerings to compete, both strategically and financially, with IBM.

In the small systems market, the two leading vendors, IBM and DEC, differ greatly, not only in reference to their products (DEC with their VAX line of superminicomputers, and IBM with their latest 9370 family, as well as the much rumored “Silverlake” replacement to the System 3X minicomputers), but also in their philosophy regarding service and support.

IBM has been as aggressive in the small systems service market as they have been in the large system market over the past year, as demonstrated by their Mid-Range System Amendment announcement (roughly a minicomputer equivalent of the CSA). Where IBM has been aggressive in service pricing on their small systems lines, DEC has been less price-oriented, preferring to stand pat on their “premium support” foundation.

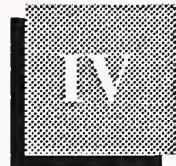
In this sense, DEC's position is in keeping with their corporate philosophy that service is a standalone product that is marketable and salable. As such, DEC prefers to address price-sensitive customers' needs with a wide range of service levels, rather than by offering a limited selection that is adjusted by discounting.



Large and Small System Issues

1





Large and Small Systems Service Issues

A

Changing User Requirements

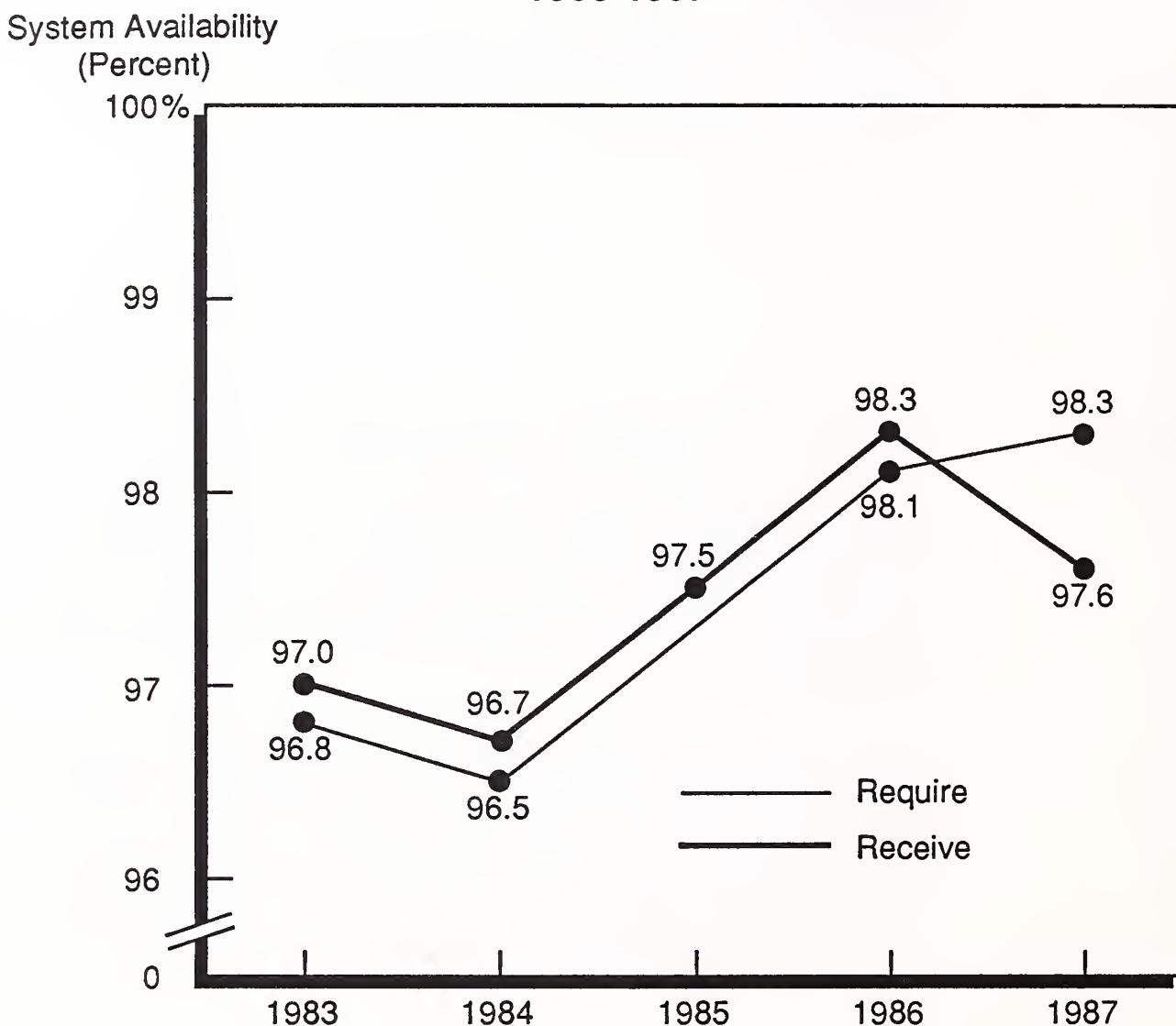
In INPUT's 1987 Analyses of Large and Small System Service, both large and small system users reported that their system availability requirements were not being met. Exhibit IV-1 and IV-2 reveal that both large and small systems service vendor performance dropped below user requirements for the first time in five years, even though service organizations have access to such technological advances as remote diagnostics, artificial intelligence (AI)-based tools, and other benefits of service automation.

While the majority of all large system users were satisfied, the percentage of small system users who were satisfied with their FE's skill level dropped from 59% to 51% in 1987. Some users reported that they sensed a drop in the skill level of their support person, causing increases in system downtime. Other users complained about the lack of spare parts availability, and how many times they waited for the field engineer to return with the correct spare part (less than half of all users were satisfied with their service vendor in this area).

These observations by users are surfacing at a critical time when service organizations are faced with the prospects of declining margins. It will be difficult for service vendors to go to their customers for additional service revenues (in the form of increased prices) if users continue to perceive a decline in service performance. Even users who opt for discounted service contracts will become disturbed when they recognize the increasing gap between system availability requirement levels and the levels that they actually receive.

Service organizations will need to continue to develop their automated support delivery mechanisms, since on-site response times are already topping out in their effect on system availability. Short of transforming all of their products to fault-tolerant systems, service organizations will need to continue to find ways to reduce the impact of a system failure.

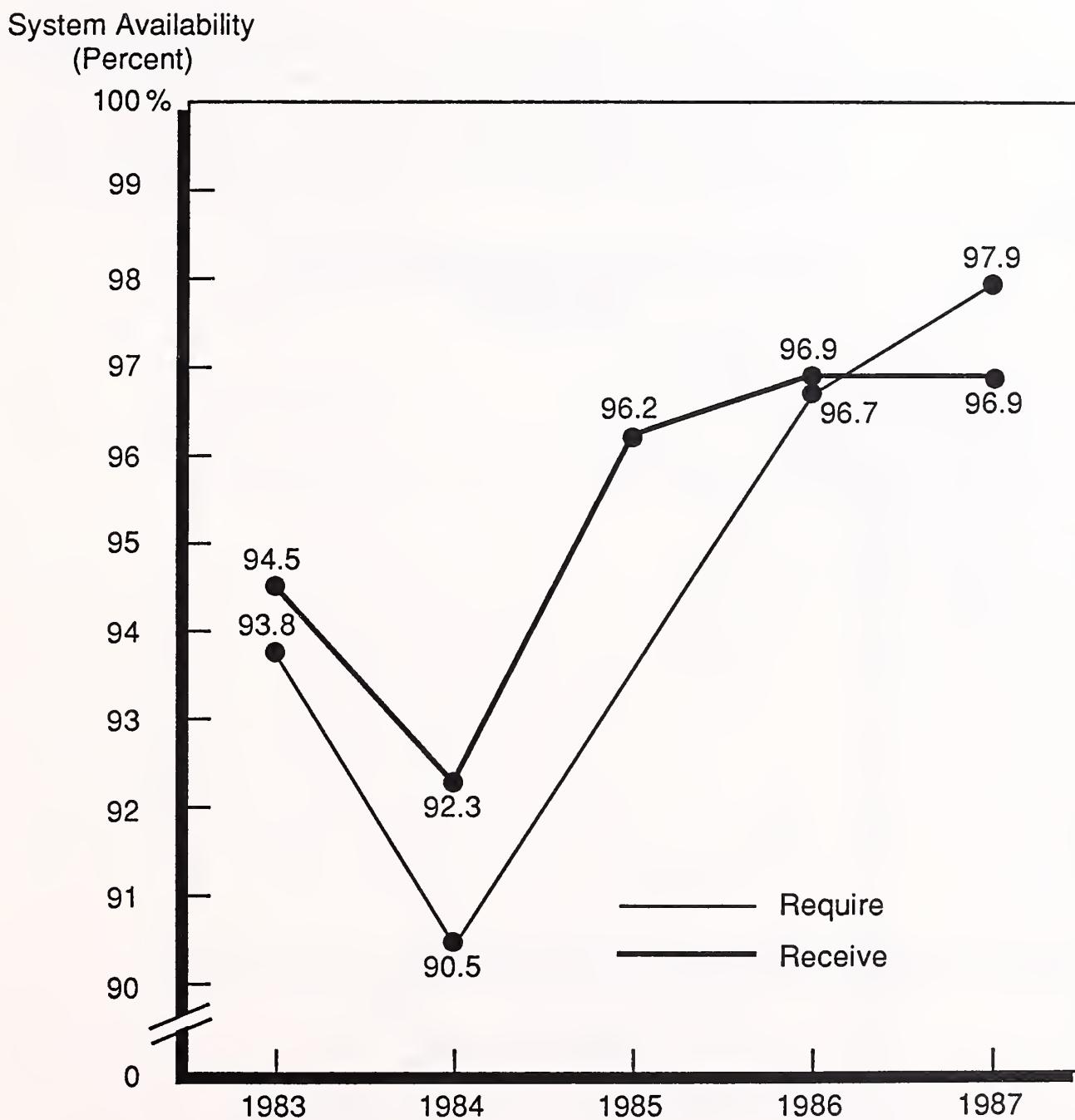
EXHIBIT IV-1

**LARGE SYSTEMS SYSTEM AVAILABILITY
1983-1987**

through further research and development of remote support and AI-supplemented diagnostic tools that will allow service to become more predictive in nature.

Furthermore, service organizations have to resist the temptation to reactively lower prices, even though user price-sensitivity is high. Again, users place the highest requirement on system availability, and if users perceive a drop in system availability that coincided with their discounted service offering, it is unlikely that they will be receptive to paying more for higher levels, since they were satisfied with system availability prior to 1987.

EXHIBIT IV-2

**SMALL SYSTEMS SYSTEM AVAILABILITY
1983-1987**

B**Service Pricing Trends**

A number of factors have caused a decline in service pricing in the last five years, including increased user pressure, increased competition, declining labor content, improved product reliability and improved service performance. Exhibits IV-3 and IV-4 show pricing trends in the large and small systems market over the last six years.

In Exhibit IV-3, note that the two PCM vendors, Amdahl and NAS, both priced their service offering in earlier years at a higher "price point" than IBM. Both companies pride themselves on their products' reliability, and both positioned themselves as premium service suppliers, with around-the-clock coverage and site management philosophies practices.

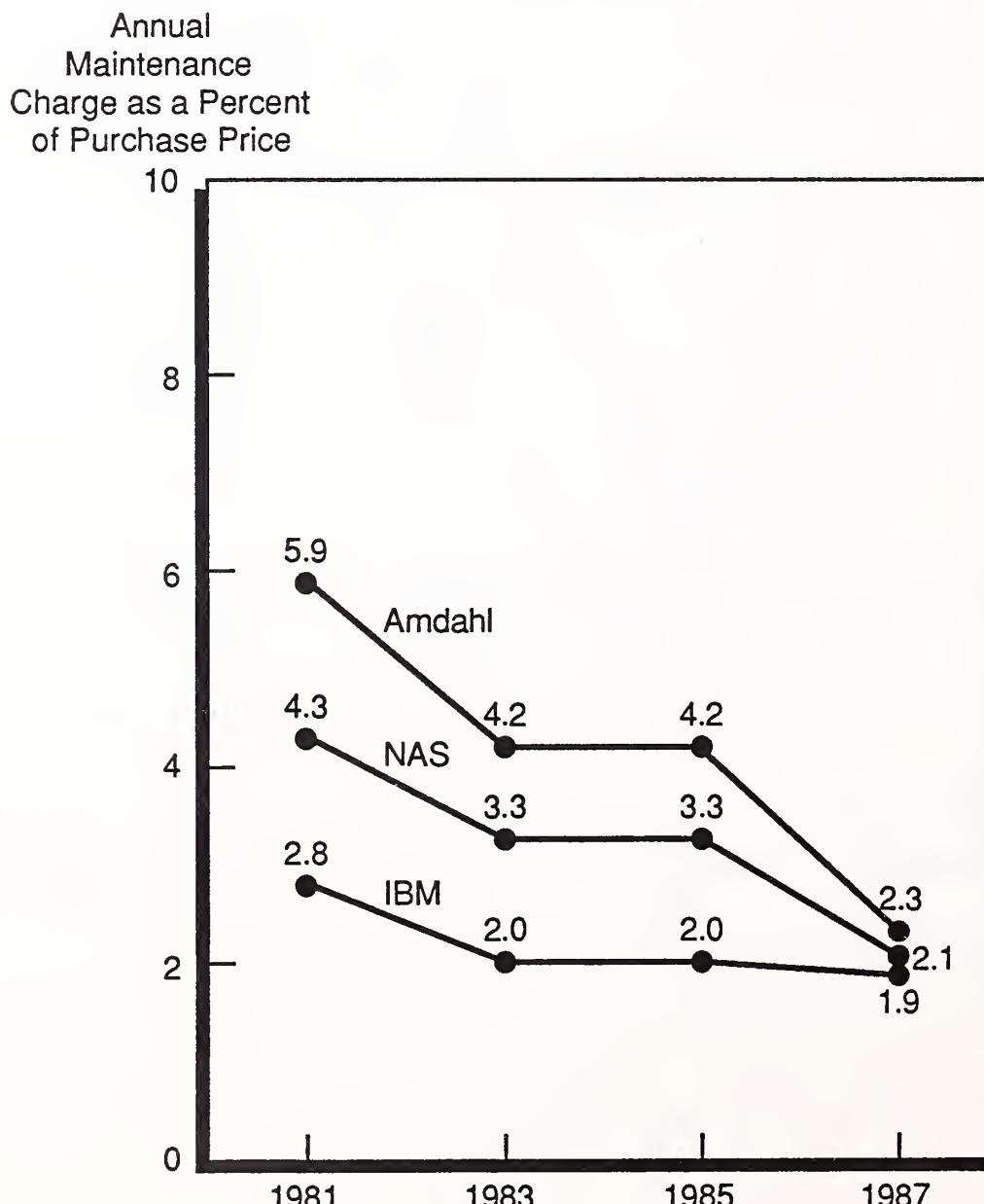
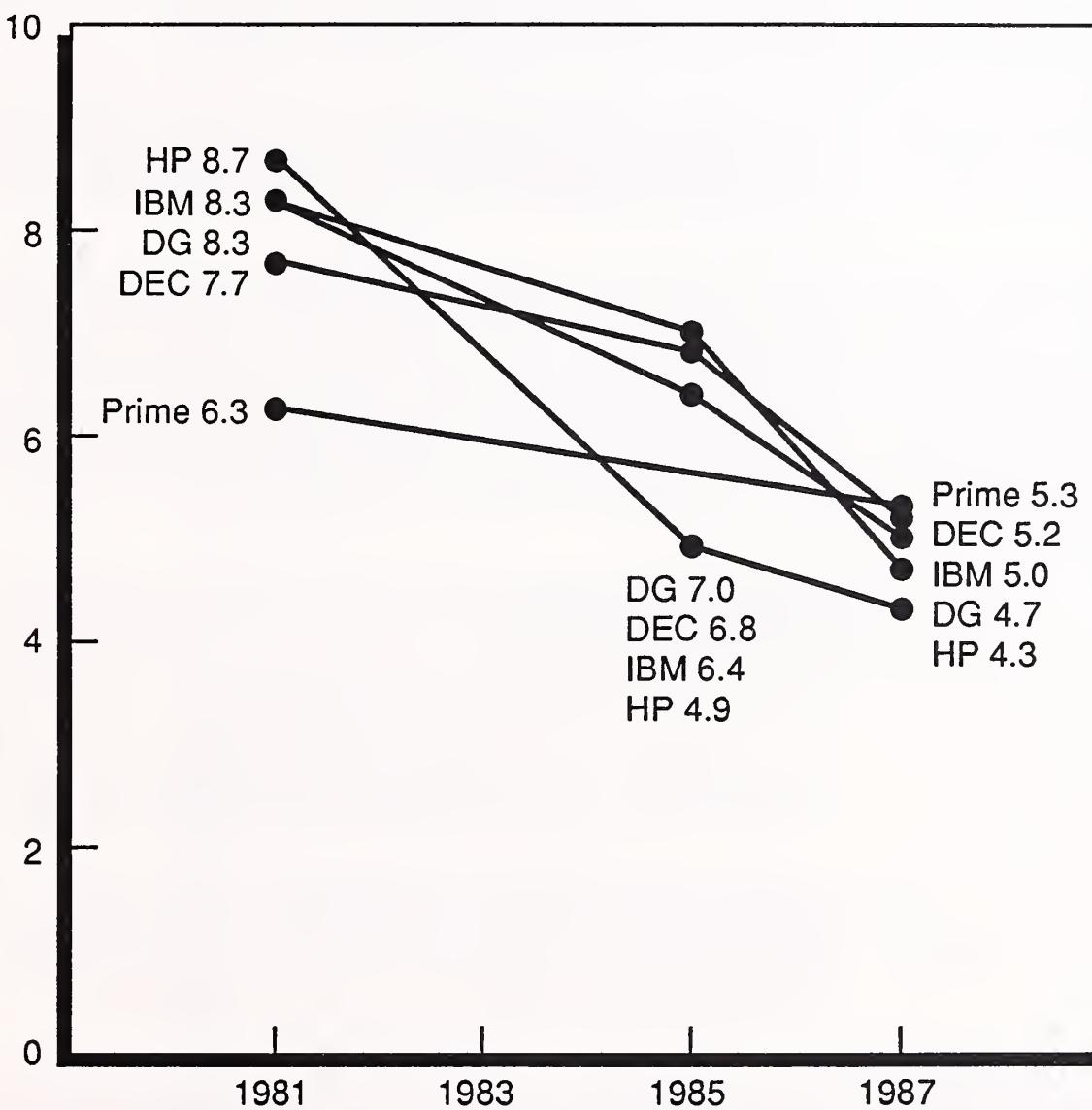
EXHIBIT IV-3**LARGE SYSTEMS PRICING TRENDS
1982-1987**

EXHIBIT IV-4

SMALL SYSTEMS PRICING TRENDS 1982-1987

Annual
Maintenance
Charge as a Percent
of Purchase Price



As IBM became more aggressive in their large systems service pricing, Amdahl and NAS had to follow. This trend places a squeeze on the PCMs, since they don't have the ability to spread the costs over other areas of the business. In addition, IBM benefits from their development of efficient service tools and techniques (e.g., hand-held terminals, remote support). Both Amdahl and NAS now price their service offerings much closer to the prices set by IBM, while still attempting to provide premium levels of service to their users. And while neither

company has indicated that a CSA-like offering is in the making, both companies must be watching user reaction to the CSA in order to determine if they need to again adjust their service prices.

In the small systems market, IBM pricing and policy changes also effect how the industry acts, but not to the extent that exists in the large systems market. Exhibit IV-4 shows that, although small systems service pricing has certainly declined over the last six years, there is less industry consistency than in the large systems market.

This is due in part to the increased amount of vertical segmentation in the small systems market, as certain vendors became focused on specific industry and application niches, as well as the presence of another market leader, DEC, for others to follow.

DEC started out by selling directly to the engineering and scientific end user markets, rather than through Information Systems (IS) channels (as is IBM's strategy). Perhaps a reflection of their initial strategy of catering directly to the end users' needs is its development of a broad range of service levels available, versus a limited number of service options that require customization (in the form of discounts) to attract price-sensitive users.

While DEC pricing certainly remains competitive with the rest of the industry, DEC rarely gets caught in a pricing war with other vendors, again preferring to allow one of their lower priced service plans fit the needs of users concerned about service costs. In addition, DEC has been able to control internal costs through innovative remote support development for their superminicomputer products, including AI-supplemented remote diagnostic systems imbedded in their entire VAX line.

Another small systems vendor that also offers a large list, or "menu," of services from which users can choose is Hewlett-Packard. Where DEC has been able to hold the line against extensive price reductions, HP has dropped the pricing on their HP 3000 minicomputer.

C

Manufacturer-TPM Competition

If 1986 could have been known as the year that the third-party maintenance market matured (through growth, acquisitions, and mergers), 1987 may very well be remembered as the year that manufacturers struck back. Leading the way in this effort to slow TPM penetration into their market and perhaps even win back some customers, IBM made a series of moves that indicated that "Big Blue" was going to become more competitive.

The following section lists four areas of conflict between manufacturer service organizations and third-party maintenance organizations.

1. The Corporate Service Amendment

The first of these moves, the Corporate Service Amendment (CSA), was actually a follow-up to a 1986 "test program" called the Enterprise Maintenance Agreement (EMA), which offered selected large IBM users significant discounts if they brought a predetermined percent of their total hardware maintenance under IBM service. In effect, this offering was a volume discount plan that hoped to encourage large IBM users to increase their use of IBM service. One condition of this offering was that the user had to agree to accept increased responsibility for system management, change management, and problem management. By doing this, the end user could reduce the need to call in IBM by taking over some of the fault determination, and IBM could pass on the cost savings to the user.

The EMA was discontinued later that year and in its place appeared the CSA announcement of October 1986. The CSA carried over the user requirement for increased system management and support through the establishment of a "help desk" by the user, as well as a certification process. The CSA also appeared to provide more attractive discounts of up to 45% to user who sign up, providing they sign a multi-year contract. Exhibit IV-5 highlights the terms and conditions of the CSA.

EXHIBIT IV-5

IBM'S CORPORATE SERVICE AMENDMENT

- Discounts Range: 4 - 45%
- Initialization Fees: \$3,500, No Renewal (Network Option \$8,600)
- Assumes: Full/Part Time Help Desk, IBM Control of Products Covered
- Contract Lengths: 1, 3, 5 Year; Termination Penalty
- Price Increase: 3.5% Per Year; If Higher No Exit Penalty

Initial competitive reaction to the CSA was guarded, most TPMs responding that they can already match IBM's discounted price levels with their discounted prices. But when IBM later placed a cap on how much IBM could raise service prices annually (3.5% per year), and extended the coverage hours to include around-the-clock coverage for all CSA customers, TPMs had to respond with similar offerings of their own. Exhibit IV-6 summarizes the competitive reaction to IBM's CSA.

EXHIBIT IV-6

CSA COMPETITIVE ANALYSIS

	IBM	TRW	SORBUS	CDC	IT
Product Coverage	Full	Full	Full*	80%	Limited
Initialization	3,500	No	No	No	No
24 Hr./7 Day	No Cost	Charge	Charge	Charge	Charge
Termination Penalty	Yes	No	No	Yes	Yes
Discount Percent Off IBM List	4 - 45	Up to 45	Unclear	10	20 -50

*Some restrictions

Earliest response came from TPM leaders TRW, Sorbus, CDC, and Intelogic Trace. Recognizing that they could not just match IBM, most of these competitive efforts tried to "one-up" the CSA by offering bigger discounts or easing the requirements placed upon the users (e.g., not requiring help desk, no certification fee, guarantees of no price increases, etc.). Those TPMs that resisted the temptation to follow suit denounced CSA-like offerings for locking the user into long-term agreements and reducing the level of vendor-supplied support.

IBM later followed the CSA with an equivalent program for small systems users called the Mid-Range System Amendment (MRSA), but by this time TPMs had already extended their offerings to small systems users.

Obviously, IBM benefits from such offerings by attracting price-sensitive users back into the fold (although earlier INPUT research indicates that only 28% of IBM 309X users, 18% of IBM 308X users, and 12% of IBM System/38 users are attracted to increased self maintenance, even for a discount). Furthermore, IBM can hope that these users' increased participation in the support process will not only cut down the service cost (to IBM) but also increase user perception of the service process and the value of service to the operations of the system. Lastly, and perhaps most significantly, the CSA and MRSA helps provide IBM with increased account control, especially with those users who opt for the five-year option. This will especially benefit IBM in slowing price-sensitive user defection to TPM.

The key question is how the CSA and competitive responses will impact the TPM industry. Whereas IBM can reduce the impact of lost revenues over other areas, most TPMs are not in a position where they can rely on other service areas (e.g., software support, parts sales, professional services) to recoup service dollars lost in the discounts. Furthermore, few TPMs carried the "help desk" requirement that at least allows the service organization to partially make up for revenues lost to reduced service prices.

IBM and other manufacturers who might follow are also at risk here. By increasing user involvement in the support process, IBM also relinquishes at least some control of the overall service quality. This may eventually reduce user satisfaction with the support that they receive, and further increase user price-sensitivity.

2. Around-the-clock Coverage

In November of 1987, IBM announced that all contract customers whose products were eligible for optional twenty-four-hour by seven-day maintenance coverage would receive this around-the-clock coverage at no additional charge. This announcement did not effect most large system users, who already received this coverage, as well as typewriter and copier users, who did not qualify for this option before. Those users who opted for pre-paid extended coverages before the announcement will be credited for their premiums paid. In the announcement, IBM stated that this was intended to "demonstrate and communicate the added value and benefit of IBM service" and "to enhance our customer's ability to use their IBM machines more effectively, at lower costs."

While this announcement could not have been considered unexpected, (since IBM offered this level of coverage already to their CSA and MRSA customer), most manufacturer and TPM service organizations had not yet had time to react in 1987. Obviously, this offering provides additional inducement for customers to choose IBM as their service source. Whether or not other service organizations can economically survive yet another slice into their revenue base is yet to be seen. It should be noted that Amdahl already provides this coverage as their only service coverage, and NAS offers it as standard, although offers a discount for reduced coverage.

Furthermore, it will be difficult for most small service organizations, both manufacturer and TPM, to build their service capabilities enough to be able to match IBM service coverage.

3. Elimination of Non-Prime T&M

As part of the same announcement as the 24/7 coverage standard, IBM announced that they would no longer offer non-prime per-call (time-and-material) maintenance coverage, with few exceptions (federal, state, and local government emergencies, life- or health-threatening situations, or equipment failures attributable to or requiring access to IBM engineering information). While stating that this move was intended "to dedicate resources to meet the IBM service agreements announced today," the announcement had the greatest impact on third-party maintenance, leasing, and maintenance brokering firms that relied on IBM to provide off-hours support (on a T&M basis) to their customers.

Maintenance brokers, usually (but not always) leasing companies, offer IBM equipment users significant discounts on service contracts; when a user requires service, the broker usually calls in IBM resources, paid for by the broker on a T&M basis. The broker's gamble is that the product requires less service (on the T&M basis) than the user pays in their service contract. This form of "maintenance underwriting" is practiced by such firms as Comdisco, Total Technical Services, Computer Service Network, and CMLC (recently purchased by Sorbus).

Smaller traditional third-party maintenance firms have also relied on IBM off-hours T&M service, particularly when supporting remote customers who require service to be performed outside of the normal hours.

Now that IBM will no longer provide non-prime T&M coverage, maintenance brokers will need to look to other sources of service coverage. Some brokers have already been using major TPMs for the last few years as a result of rising IBM T&M charges; however, the use of TPMs forces the brokers to lose some of the sales edge they had when they could tell a potential customer that they would receive "IBM service".

TPMs that once used IBM T&M service will need to either build up their own service force or risk losing business through partnerships with other TPMs. While some TPMs have commented that the pool of ex-IBM engineers grew as a result of IBM's early retirement program, it is difficult to project that many TPMs will be able to grow their business substantially enough to provide around-the-clock coverage.

4. Tighten the Spares Pipeline

In September of 1987, IBM announced that they were reducing the number of spare parts centers from 100 branch locations to 21 regional spares centers. IBM stated that the reason for this reduction was due to the small number of spare parts orders in some of their spares centers. At the same time, IBM announced that emergency order charges would be increased to \$25 per part number and an additional \$250 emergency order charge would be placed on all orders placed outside of the regularly scheduled hours of the particular parts center (normally 8am to 7pm local time) if IBM personnel are required to travel to process the order.

While this move does not make it impossible for TPMs and others to get spare parts, it certainly makes it more difficult, since TPMs may now have to contact centers out of their immediate area. The move makes good business sense for IBM, since now IBM can better monitor spare usage and locations, in addition to reducing the costs involved with fewer parts inventories.

Spare parts are a major concern in the service industry for both manufacturers and, more significantly, TPMs. TPMs have attempted to improve their ability to gain access to spares from manufacturers through litigation. Two significant tests involving restraint of trade through manufacturers limiting access to spares are the Allen Myland, Inc. (AMI) versus IBM, Datagate versus Hewlett-Packard, and Hypoint, Inc. versus Hewlett-Packard cases. All three cases are still in litigation; their outcome is being closely monitored by manufacturers and third-parties alike.

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Growth in Network Services

Given the growth expectations of both the telecomm product and service market (forecasted earlier in this report), it is not surprising that most service organizations have placed a high priority on developing their telecomm support strategies. In dealing with this issue, service organizations must overcome the basic problem of how to gain the necessary resources (e.g., parts, engineers, expertise, etc.) to become successful in the telecomm industry.

Some organizations have used the acquisition route. The best known example of this was IBM's acquisition of telecomm giant Rolm Corporation in late 1984 which melded completely into IBM in 1987 with the

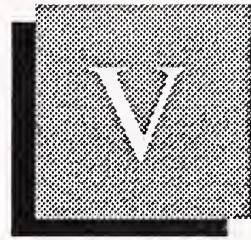
merging of sales and support functions. While the marriage of IBM and Rolm has not always been trouble-free (much has been said about the differences in corporate “cultures”), the Rolm acquisition provided IBM with a firm foothold in the telecomm marketplace, as evident from their 9751 CBX replacement with the Rolm product.

Another indication of IBM’s increased focus on the telecomm support market included the network option of the CSA and MRSA discount programs, which in essence replaced the Customer Managed Network Amendment that provided discount incentives to users who assumed some level of network system management.

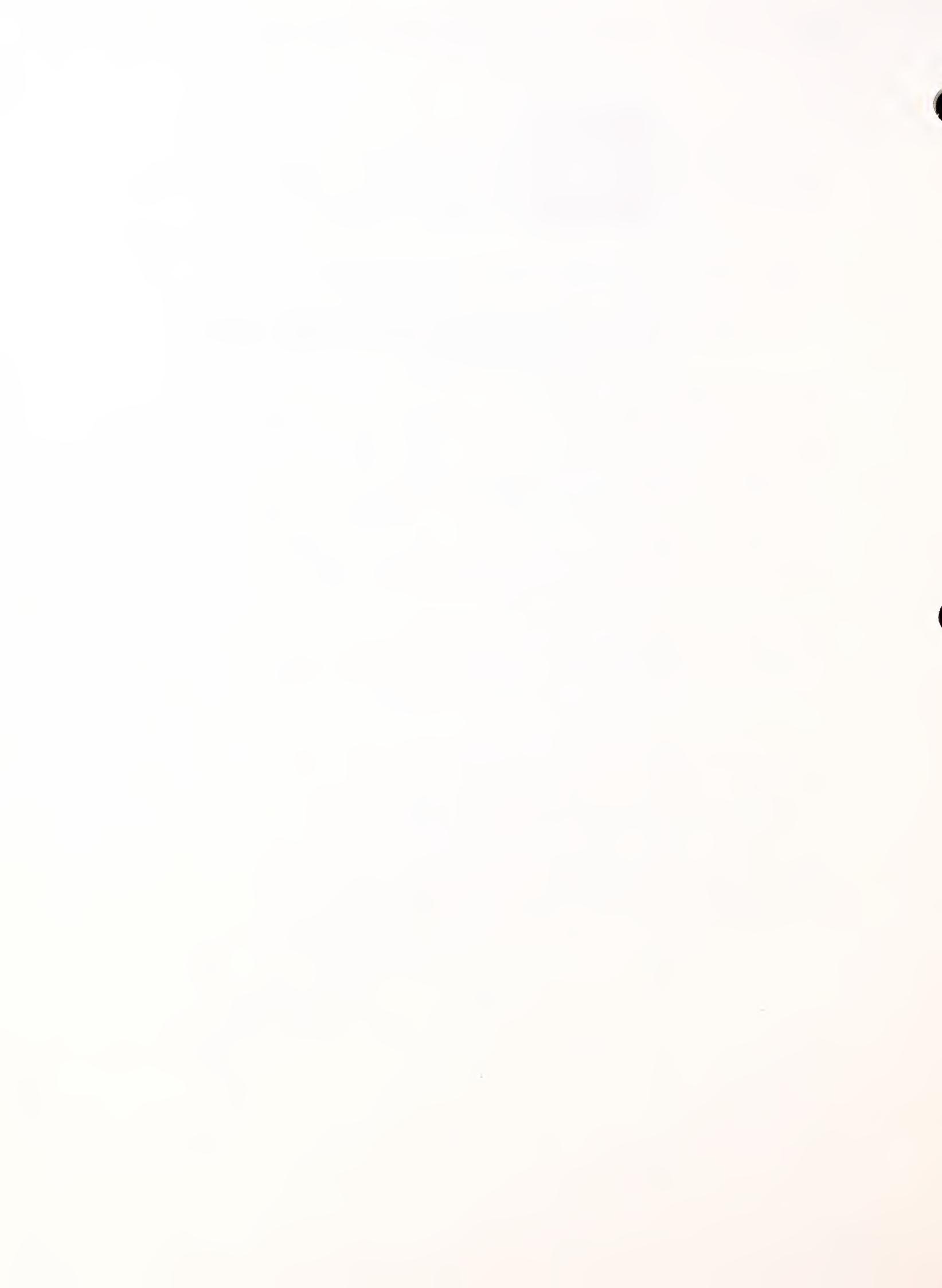
IBM’s networking moves may be in response to the success that small system rival DEC has had in the sales and support of networking products and systems. DEC has been able to leverage their experience with their own 15,000 node EASYnet to expand their network support offerings, including the following services: Planning (physical design consulting), Implementation (installation management and certification), Operations (including ongoing maintenance), Network tools, and service packages that combine these services, such as ServPak, DECsite Services (which provide complete facility design and construction services) and DECmove (professional services regarding equipment moves).

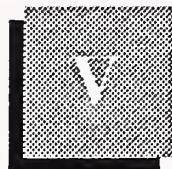
Another company gaining telecomm presence through acquisition was Unisys with their recent purchase of Timeplex, a leading vendor of T1 and network management systems. This acquisition strengthens Unisys’ capabilities in the key networking arena.

Like DEC, Sun Microsystems is also a vendor that is tied closely to networks. In fact, Sun touts itself as a network supplier (“The network IS the computer,” a play on DEC’s “DEC has it now” ads). Where DEC has enormous resources available to develop network support expertise, Sun has to look to others to provide the support. So when Sun announced two new network services, Network Design (including installation planning and implementation) and Network Analysis (management and optimization services) in mid-1987, Sun looked to strategic alliances with networking specialists to assist in providing these services to its user base.



Recommendations and Conclusions





Recommendations and Conclusions

After years of unbridled revenue and profit growth, the computer service and support industry is faced with its second straight year of slowed growth. While product sales appear to be on the rebound, a number of factors have combined to suggest that service growth will continue to slow into the 1990s. Users will continue to pressure service organizations to reduce maintenance pricing, particularly in recognition of improved hardware reliability. The service organization will find itself under increased pressure from its own "parent" organization to improve its performance in terms of both service quality and profitability.

During this time, service organizations will be challenged by users to expand the definition of service and support, particularly as user requirements for such services as software support, telecommunications support, and systems performance support continue to grow.

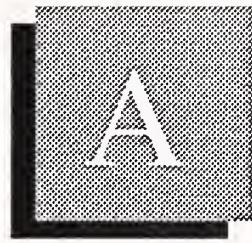
As suggested earlier in this report, the very model used by service organizations to price service will need to evolve to reflect the growing sensitivity to hardware maintenance price increases while at the same time exploit the need for more and better software support and professional services. By moving in this direction, service organizations will adopt a more performance-oriented support position, connecting their value not only to the continued operations of a computer system, but also to the improved performance of that system.

These moves will also better differentiate the manufacturer-based service organization from third-party maintenance, who as of yet show little inclination to expand far from its role as hardware maintainer. In doing so, the manufacturer-based service organization will be able to avoid the service price wars that marked 1987.

Some leading systems service organizations have already taken steps in this direction. Digital Equipment Corporation, a company that is recognized as much for its service innovativeness as for its products, has

already demonstrated its recognition of the growing need to expand into such high-growth areas as network support services. IBM, with its acquisition and eventual assimilation of Rolm Corporation into its product and support strategies, also showed its recognition of this market's future.

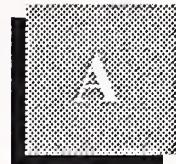
System manufacturers will also need to continue to automate service delivery. Most, if not all service organizations have realized productivity gains through the automation of dispatching, parts tracking, and billing functions. Most major manufacturers have added remote diagnostics to their support functions (although rarely is this function integrated with other support automation), improving support responsiveness and implementation. A few manufacturers (DEC and NAS) have already successfully implemented artificial intelligence (AI)-based diagnostic tools into their products.



Appendix: Definitions

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Applications Software - Software that performs processing to service user functions.

Artificial Intelligence - The academic discipline involving the study of the processes by which humans perceive and assimilate data (and use reasoning to process this data) for the purpose of duplicating these processes within computer systems. Also, this term refers to the computer systems that accomplish these duplicated processes.

BOC - Bell Operating Company.

Consulting - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.

Dispatching - The process of allocating service resources to solve a support-related problem.

Divestiture - The action, stemming from antitrust lawsuits by the Department of Justice, which led to the breakup of AT&T and its previously owned local operating companies.

Documentation - All manuals, newsletters, and text designed to serve as reference material for the ongoing operation or repair of hardware or software.

End User - May buy a system from the hardware supplier(s) and do own programming, interfacing, and installation. Alternatively, may buy a turnkey system from a systems house or hardware integrator.

Expert Systems Applications - Applications for expert systems—a computer system based on a data base created by human authorities on a particular subject. The computer system supporting this data base contains software that permits inferences based on inquiries against the

information contained in the data base. Expert systems is often used synonymously with "knowledge-based systems," although this latter term is considered to be broader and to include expert systems within its scope.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs that include parts and a bill of material to effect the change in hardware.

Escalation - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.

Fiber Optics - A transmission medium which uses light waves.

Field Engineer (FE) - For the purpose of this study, field engineer, customer engineer, service person, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Field Service Management System (FSMS) - A specialized application program that automates some (if not all) of the following activities of a field service organization: call handling, dispatching, parts inventory and tracking, billing, efficiency reporting, and other functions. Ideally, the system accesses one data base from which each function can use and modify data.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. May also develop control system software in addition to installing the entire system at the end-user site.

ISDN - Integrated Services Digital Network. A proposed standard for digital networks providing transport of voice, data, and image using a standard interface and twisted pair wiring.

LADT - Local Area Data Transport. Data communications provided by the BOCs within local access transport areas (LATA).

Large System - Refers to traditional mainframes including at the low end IBM 4300-like machines and at the high end IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of \$350,000 and higher.

Mean Time Between Failures (MTBF) - The elapsed time between hardware failures on a device or a system.

Mean Time to Repair - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and returned to the user for his utilization.

Mean Time to Respond - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.

Microcomputer - A microprocessor-based single- or multi-user computer system typically priced less than \$15,000. A typical configuration includes an 8- or 16-bit CPU, monitor, keyboard, two floppy disk drives, and all required cards and cables.

Minicomputer - See Small System.

Operating System Software (Systems Software) - Software that enables the computer system to perform basic functions. Systems Software, for the purposes of this report, does not include utilities or program development tools.

PBX - Private Branch Exchange. A customer premises telephone switch.

Peripherals - Includes all input, output, and storage devices, other than main memory, that are locally connected to the main processor and are not generally included in other categories, such as terminals.

Planning - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning, "installation" planning.

Plug-Compatible Mainframe (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.

Professional Services - A category of services including system design, custom programming, consulting, education, and facilities management.

RBOC - Regional Bell Operating Company. One of seven holding companies coordinating the activities of the BOCs.

Remote Diagnostics - Gaining access to a computer from a point physically distant from the computer in order to perform problem determination activities.

Remote Support Implementation - An extension of remote diagnostics where some level of support delivery is performed from a point physically distant from the computer. Currently, this capability is more common to software support where problems can be solved or circumvented through downline loading of new code (fixes).

Reseller - A marketing organization that buys long-distance capacity for others at wholesale rates, selling services at retail but discounted prices and profiting on the difference.

Small Business Computer - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20M bytes of disk capacity, provides multiple CRT workstations, and offers business-oriented systems software support.

Small System - Refers to traditional minicomputer and superminicomputer systems ranging from a small multi-user, 16-bit system at the low end to a sophisticated 32-bit machine at the high end.

Software-Defined Network - A private network which uses public network facilities and which is configurable on an as-needed basis by the user (see Virtual Private Network).

Software Engineer (SE) - The individual who responds (either on-site or via remote support) to a user's service call to repair or patch operating systems and/or applications software.

Software Products - Systems and applications packages that are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

Superminicomputer - See Small System.

Systems Integration - The action of a single service vendor's design, development, and implementation of a system or subsystem including integration of hardware, software, and communications facilities for a customer.

System Interruption - Any system downtime requiring an Initial Program Load (IPL).

Systems House - Integrates hardware and software into a total turnkey system to satisfy the data processing requirement of the end user. May also develop systems software products for license to end users.

T-1 - Refers to a standard 1.544 megabit per second digital channel used between telephone company central offices and now used for microwave, satellite, fiber optics, or other bypass applications.

Third-Party Maintenance (TPM) - Any service provider other than the original equipment vendor.

Training - All audio, visual, and computer-based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.

Turnkey System - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

VSAT - Very Small Aperture Terminal. A small satellite dish system, usually using Ku-band frequencies.

Virtual Private Network - A portion of a public network dedicated to a single user.



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